VOLUME XVIII APRIL 1925 NUMBER 4

Southern Medical Journal

Journal of The Southern Medical Association

Published monthly by the Southern Medical Association, Empire Building, Birmingham, Ala. Annual subscription $3.00. Entered as Second-Class Matter at the Postoffice at Birmingham, Ala., under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of Oct. 3, 1917, authorized Dec. 20, 1921.

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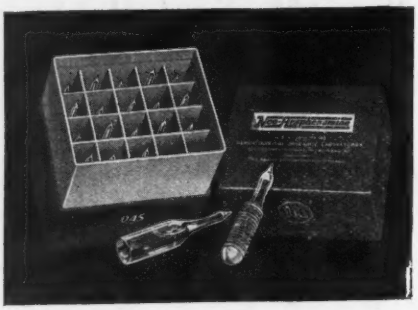

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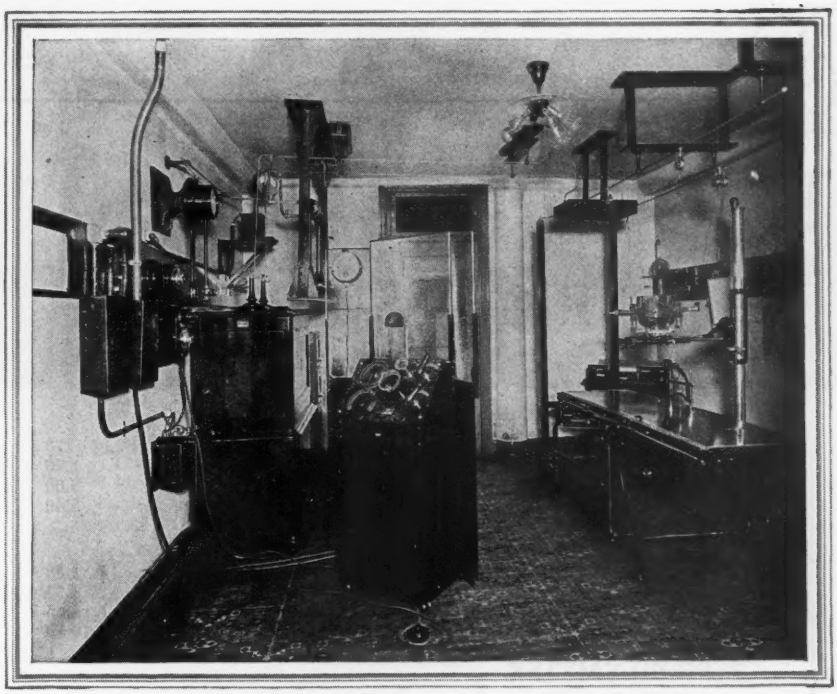

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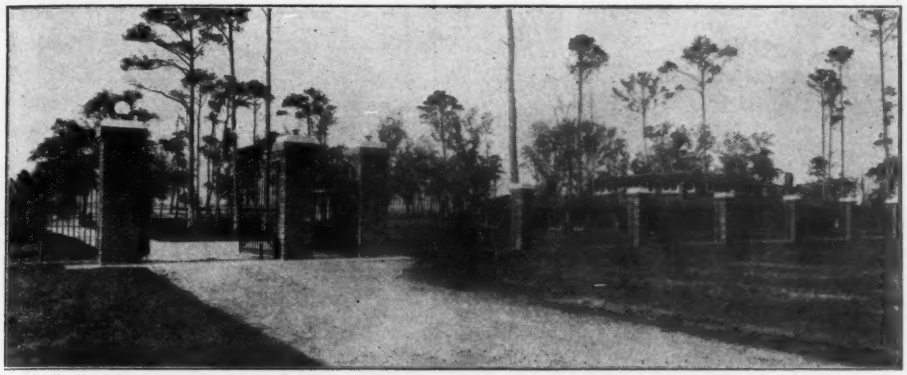

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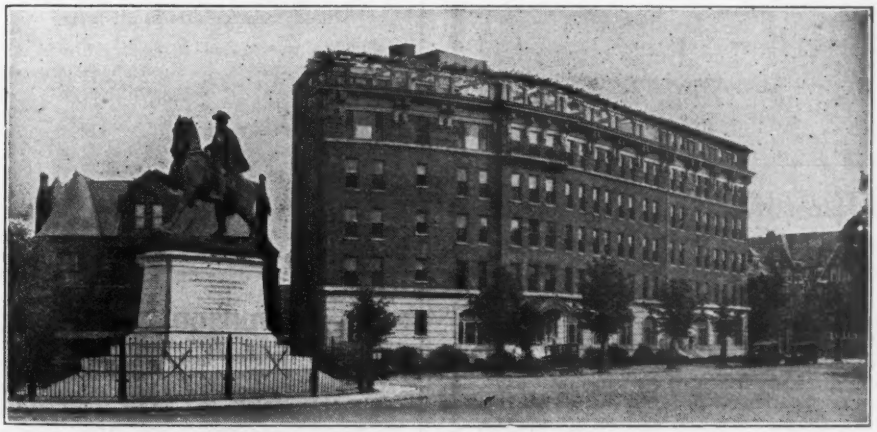

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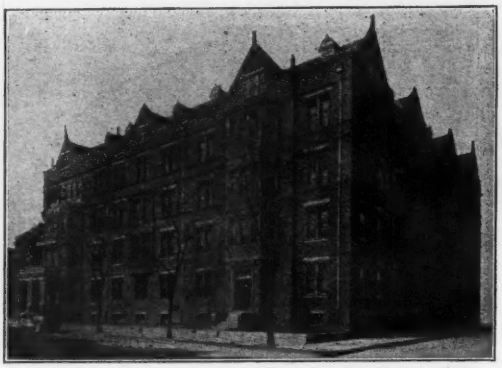

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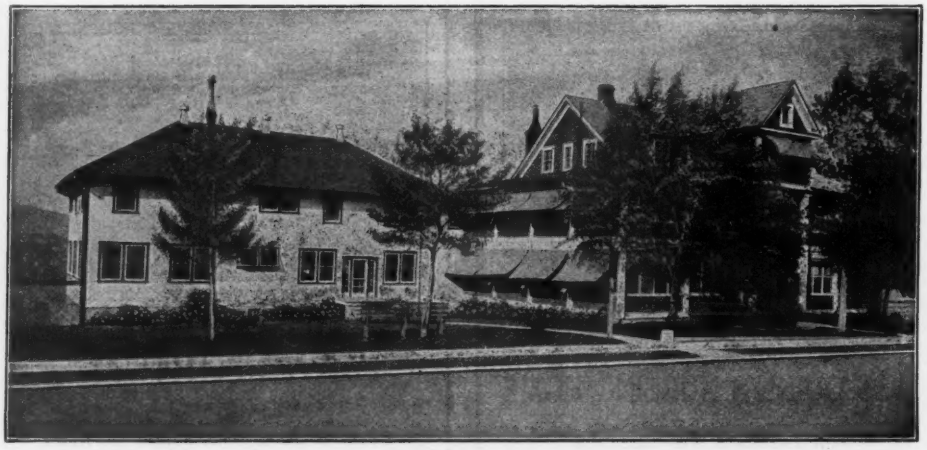

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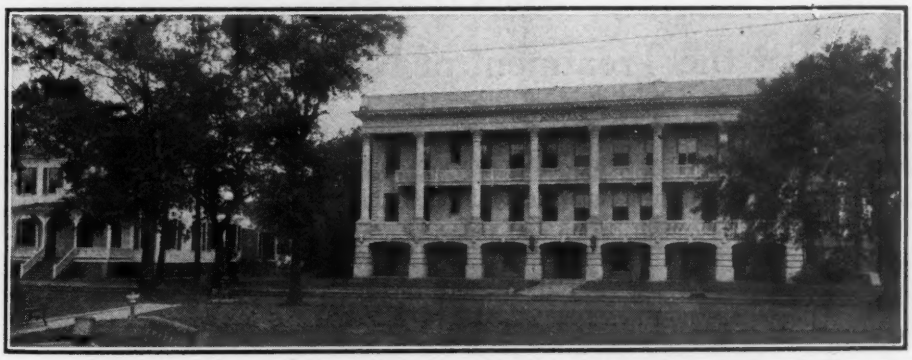

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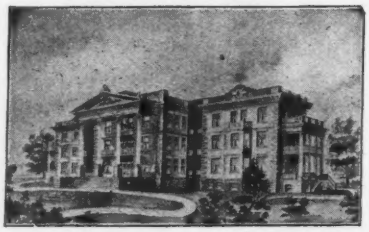

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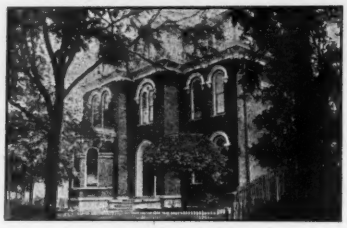

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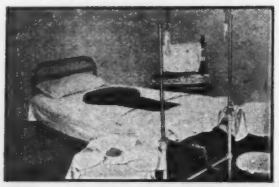

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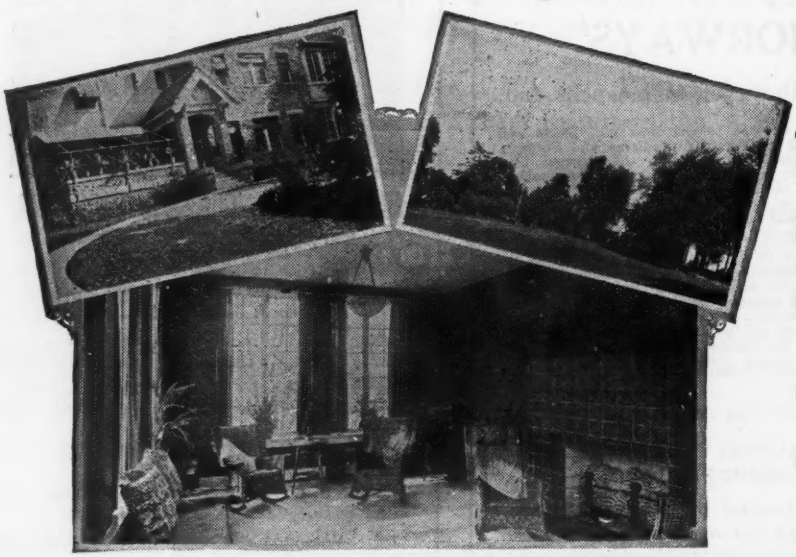

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Volume XVIII APRIL 1925 Number 4

SYMPOSIUM ON SCARLET FEVER

SCARLET FEVER*

By GEO. F. DICK, M.D.,
and
GLADYS HENRY DICK, M.D.,
Chicago, Ill.

When we began the study of scarlet fever, in 1912, it was regarded as a disease of unknown etiology. None of Koch's requirements had been met in its explanation. Various organisms had been described as the cause of scarlet fever, but their constant presence in the disease had not been verified, except in the case of the hemolytic streptococcus. Hemolytic streptococci of one kind or another were known to be almost constantly associated with scarlet fever. But it had not been shown that any one type was characteristic of the disease. There were no morphological, cultural, or immunological characteristics by which the streptococci of scarlet fever could be differentiated from streptococci associated with other pathological processes. Without this, and without the production of experimental scarlet fever, it was not possible to determine whether the hemolytic streptococci were causal organisms, or secondary invaders.

Experimental scarlet fever had not been produced. Atypical rashes, or fever and leukocytosis had been described in animals following inoculation with different materials of scarlet fever origin; but these had been inconstant. No one had obtained symptoms sufficiently typical to justify the designation of experimental scarlet fever.

Besides the variations in the streptococci associated with scarlet fever, and the failure to produce the disease experimentally, the lasting immunity usually conferred by one attack was not considered characteristic of streptococcus infections.

The idea was prevalent that a filterable virus was responsible for the disease, but this was based upon negative, rather than positive evidence.

Since the earlier work upon the bacteriology of scarlet fever, new cultural methods had been developed. In beginning our study, we first went over the bacteriology of the disease, employing these newer methods. Bacteriologic examinations were made of the throat, blood, urine, feces, and skin scales of scarlet fever patients, and of organs obtained post mortem. Aerobic and anaerobic cultures were made in a variety of media.

In these cultures, we found a number of bacteria commonly associated with scarlet fever, but no organism occurred more frequently than the hemolytic streptococcus. A comparison of the bacteriology of the throat, blood, and urine indicated that, during the acute angina, occasional organisms, few in number, find their way into the blood stream, and may be excreted through the kidneys. No organism was found in the blood of early uncomplicated cases in large numbers or frequently enough to indicate a causal relation to scarlet fever.

The various bacteria isolated were inoculated into guinea pigs, rabbits, dogs, mice, pigeons, and small white pigs. The inoculations were made in the throat, subcutaneously, intraperitoneally, and intravenously. In this series of animal experiments, reported in 1914, an occasional rash was obtained, and less frequently, desquamation. But these symptoms followed inoculation with a variety of organisms, and no one organism produced constantly, in any species, a condition that could be accepted as experimental scarlet fever.

*Read in Symposium on Scarlet Fever, Joint Session of the Section on Pediatrics, Section on Pathology and Section on Public Health, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

Since scarlet fever is a disease characterized by the production of a high degree of immunity, we thought that a study of the immune reactions of the bacteria most commonly associated with the disease might give some information as to which organisms took part in the infection, either as primary, or as secondary invaders. Suspensions of the different organisms were tested for agglutination and for complement fixation with blood sera from convalescent scarlet fever patients. Cutaneous tests were also made with suspensions of heat-killed bacteria. The results of these tests were reported in 1916. They indicated that, while agglutination and complement fixation may be demonstrated with a variety of bacteria associated with scarlet fever, the hemolytic streptococcus is the only organism that produces immune bodies with any degree of constancy during the course of the disease.

We had thus verified the results of previous investigators as to the association of hemolytic streptococci with scarlet fever, and the production of immune bodies. But the association of an organism with a disease, and even the production of immune bodies to it, do not constitute proof of its etiologic significance. It might be present as a secondary invader, and, as such, it might stimulate the formation of antibodies.

The production of experimental scarlet fever remained the essential step in the determination of the etiology of the disease. In order to learn if it is possible to obtain an acceptable scarlet fever in laboratory animals, these were inoculated in the throat, subcutaneously, intraperitoneally, and intravenously with fresh blood serum, blood plasma, whole blood, throat mucus, and urinary sediment from early cases of scarlet fever, and with macerated skin scales from desquamating cases. They were also inoculated with ground tonsils, lymph glands, and spleens obtained as soon as possible after death. It was reasonable to believe that in some of the inoculations, each species of animal used had received material containing the specific organism of scarlet fever. The negative results of these experiments led us to conclude that laboratory animals are comparatively insusceptible, and that it would be necessary to use human volunteers for the production of experimental scarlet fever.

Many attempts had been made to produce scarlet fever in man. The successful inoculation of smallpox had led to the hope of a like success from the inoculation of scarlet fever. Erasmus Darwin, the grandfather of Charles Darwin, had urged the medical profession to undertake such inoculations in the hope of discovering a method of preventing more severe attacks. Inoculation experiments in man had been made with material from erythematous areas, serum from miliary vesicles, skin scales, and blood from scarlet fever patients without success. Accidental inoculations of human beings had been described, but they had occurred under conditions that threw no light on the etiology.

Even with human volunteers, we could not expect to obtain experimental scarlet fever readily, for it was known that less than one-half of the persons exposed contract the disease.

Before undertaking the human experiments, we attempted to determine, by means of immune reactions, where in the body of the scarlet fever patient the specific organism exists in greatest abundance. The antigenic properties of the blood serum were compared with the antigenic properties of the throat secretions by means of complement fixation tests with the sera of convalescent patients. These tests showed no evidence of any specific virus or antigen in the blood serum. And similar tests failed to show any antigen in extracts of the spleen or lymph glands. In one instance, there was a weak complement fixation with an antigen prepared from scarlatinal throat mucus.

On the supposition that the antigenic property of throat mucus was due to organisms capable of growth, cultures of the throat were made in broth and in whey. When such cultures of the scarlatinal throat mucus were employed as antigens in complement fixation tests, positive results were obtained with 54.6 per cent of the convalescent sera.

The results of our bacteriologic examinations and immune reactions indicated that the specific organism of scarlet fever is present in the throat mucus, but is not present in the blood of early, uncomplicated cases. Before going further with the complicated bacteriology of the throat, we attempted to learn, by human inoculation experiments, if the specific organism is present in the blood in some form unrecognized by the cultural methods or immune reactions employed.

Healthy young adults who said that they had not had scarlet fever were selected. The first volunteers were inoculated with blood serum freshly obtained from early, uncomplicated cases of scarlet fever. The serum was swabbed on the tonsils of each volunteer, and daily observations were made for sore throat, fever, and a rash on the skin or on the palate. The results of these experiments were entirely negative. The next

volunteers were inoculated subcutaneously with fresh blood serum in amounts ranging from one-half to five cubic centimeters. These injections were not followed by any local reactions, or by any symptoms of scarlet fever. Another group of volunteers were inoculated subcutaneously with whole blood from acute scarlet fever. The blood was withdrawn from the patient's veins and injected into volunteers while it was still warm. The results of these experiments were also entirely negative. In all, fifteen volunteers were inoculated with blood serum or whole blood.

These experiments tended to confirm our conclusion, based upon bacteriologic examinations and immune reactions, that the specific organism is not usually present in the blood stream during the early stage of uncomplicated scarlet fever.

The immune reactions had given some indication of the presence of a specific organism in the throat, and a more exhaustive study of the bacteriology of the throat was now undertaken. We first attempted to learn whether or not scarlet fever is caused by a filterable virus. Throat secretions, obtained early in the disease, were shaken in a small amount of broth, and the suspensions filtered. Volunteers were inoculated in the throat with the filtered material. These volunteers remained well. Following this, scarlet fever patients were given broth to gargle, and after filtering, the broth was inoculated subcutaneously in another series of volunteers. None of the volunteers in this series developed scarlet fever. Some showed, at the site of inoculation, a slight local redness that disappeared at the end of forty-eight hours. These local reactions correspond to the skin test described later, and indicate that some of the volunteers, who did not acquire scarlet fever on subcutaneous inoculation of filtered throat mucus, were actually susceptible to the disease.

These experiments had failed to demonstrate any filterable virus in the throat in scarlet fever, and we began inoculation of volunteers with pure cultures of the bacteria most commonly found in the throat secretions.

Since the hemolytic streptococcus is the organism most commonly found in scarlet fever, and the one to which immune bodies are most frequently produced, the next volunteers were inoculated with hemolytic streptococci isolated from early cases. In this series, thirty volunteers were used. The inoculations were made by swabbing 24 to 48 hour cultures of the organisms on the tonsils and pharynx. In this series, no experimental scarlet fever was obtained. Most of the volunteers remained entirely well. They did not complain of sore throat and daily examinations of the throat revealed no signs of inflammation.

There were, however, a few who developed sore throat accompanied by a fever and leukocytosis, and a transient enlargement of the cervical lymph glands, without any rash on the skin or on the palate.

Volunteers were also inoculated with some of the other organisms frequently present in scarlet fever. The results of these inoculations were negative.

We thought that failure to obtain the rash in the experimental inoculations with hemolytic streptococci might be due to a relative insusceptibility on the part of the volunteers, and decided to do some further inoculation experiments using volunteers of an intelligent type, who could give their full personal and family history, and to select them, so far as possible, from those who had spent their childhood in rural districts or in homes where an ordinary attack of scarlet fever would probably have been recognized.

In this series, we obtained a case of typical scarlet fever by inoculation with a pure culture of a hemolytic streptococcus isolated from a lesion on the finger of a nurse who acquired the disease while caring for a convalescent scarlet fever patient.

This was the first case of scarlet fever produced experimentally by the inoculation of a pure culture of any organism. It was reported October 6, 1923.

The greatest difficulty in the determination of the etiology of scarlet fever had now been overcome; but it was still necessary to learn whether the experimental disease had been produced by the hemolytic streptococcus, or by a filterable virus associated with it in the culture. A second group of volunteers were inoculated with a culture of the same organism after it had been passed through a Berkefeld "V" filter. These volunteers remained well. After two weeks had elapsed, and they were still well, they were inoculated with the unfiltered culture. Forty-eight hours later, one of them developed scarlet fever. This experiment furnished further evidence that the disease was not caused by a filterable virus, but was due to the hemolytic streptococcus itself.

There were still some difficulties. Streptococci of the same cultural type cannot be demonstrated in all cases. They may be divided

into two main groups according to their effect upon mannite. We had succeeded in producing two cases of experimental scarlet fever with a strain that fermented mannite. In each case, the organism had been recovered from the experimental disease, and again grown in pure culture. All of Koch's laws were thus fulfilled, except that one which requires that the organism be constantly present in the disease. In order to meet this requirement, it was necessary to learn whether or not scarlet fever can be produced with the streptococci that do not ferment mannite.

In the series of inoculations in which experimental scarlet fever had been obtained, only two of the ten volunteers acquired the disease. These ten volunteers were all young adults who said that they had not had scarlet fever; and so far as they knew, they had never been directly exposed. They were all inoculated with the same culture. The failure of some to acquire the disease, while others developed it in a typical form was attributed to a difference in susceptibility. We wished, if possible, to find some means of determining susceptibility to scarlet fever in order to select susceptible volunteers for our next experiments. We had previously made attempts to demonstrate immunity by means of skin tests. In 1916, we described the reaction following intracutaneous injection of killed streptococci. These reactions had shown nothing specific. Since hemolytic streptococci are found in the throats of scarlet fever patients, and are seldom present in the blood stream of uncomplicated cases, it was evident that the rash is not produced by the direct action of the hemolytic streptococcus on the skin. This suggested that the hemolytic streptococcus, growing in the throat, produces some substance, which, in turn, is responsible for the rash. If we could find this substance, it might be possible to use it in skin tests for determining the susceptibility of our next volunteers.

The Berkefeld "V" filtrate that had failed to produce experimental scarlet fever in the previous experiments was now used for cutaneous tests. Intradermal injection of this filtrate was followed by local inflammatory reactions more frequently in persons who had no history of scarlet fever than in convalescent patients. It was found that when the filtrate was used in the proper dilution, it gave negative, or only slightly positive reactions, in persons convalescent from scarlet fever, and positive reactions in a certain number of the persons who gave no history of the disease.

Volunteers for the next experiment were selected by means of skin tests made with this filtrate. Two were chosen: one with a negative, and one with a positive skin reaction. A hemolytic streptococcus that did not ferment mannite was isolated from the throat of a scarlet fever patient, and part of a 48 hour culture of this organism was swabbed on the tonsils and pharynx of each volunteer. The volunteer who had shown a negative skin test remained well; while the volunteer with a positive skin test developed scarlet fever.

The hemolytic streptococci used in these experiments had now fulfilled all the requirements of Koch's laws, and the conclusion that they are the cause of scarlet fever was justified.

Filtrates from cultures of the streptococcus used in the last experiments produced cutaneous reactions similar to those obtained with filtrates from the mannite fermenting strain.

The results obtained thus far had indicated that the reactions following intradermal injection of the filtrates furnished a means of determining immunity to scarlet fever.

That the negative results in convalescent scarlet fever were not due to an inability of the skin to react was shown by the fact that a number of patients had positive Schick tests on one arm at the same time that the test with the streptococcus filtrate was negative on the other arm.

That the positive reactions in persons who had not had scarlet fever were not due to foreign protein in the culture medium was shown by negative results on intradermal injection of undiluted, sterile culture medium.

Further evidence of the specific relation of this test to scarlet fever was afforded by the following experiments:

Mixtures of equal volumes of the filtrate with convalescent scarlet fever sera were incubated thirty minutes. Control mixtures of salt solution and filtrate were also incubated. Skin tests were made with the two mixtures in persons who had previously shown positive reactions. At the end of twenty-four hours, the tests with the serum mixtures were negative; while those in which salt solution had been mixed with the filtrate were positive.

These results indicated that the blood of convalescent scarlet fever patients contains a substance capable of inhibiting the action of the filtrate on the skin.

Persons with positive skin tests were then given convalescent scarlet fever serum by intra-

muscular injections. Skin tests made after this passive immunization were negative.

When some of the persons, with positive skin tests, were injected with larger amounts of the filtrate, they developed general malaise, nausea, vomiting, fever, and a generalized scarlatinal rash. Following this reaction, the skin test became negative, or slightly positive. And the blood serum of these persons was found to have acquired the property of neutralizing the action of the filtrates as the convalescent scarlet fever serum had neutralized it.

The negative skin reactions in convalescent scarlet fever patients; the neutralization of the filtrate by convalescent serum; and the scarlatinal rashes, accompanied by other symptoms characteristic of scarlet fever following injection of small amounts of the sterile filtrate indicated that we were dealing with a substance specific for scarlet fever.

The short interval between the injection of the filtrate and the beginning of the reaction compared with the incubation period of about forty-eight hours in experimental scarlet fever; and the more rapid disappearance of the symptoms, indicated that the effect was produced by a soluble toxic substance, rather than by a filterable virus.

The resistance to heat at temperatures ordinarily employed to kill bacteria furnished further evidence that the filtrate contained a toxin rather than a living virus.

Neutralization of the toxic substance by the blood serum of persons immunized by subcutaneous injections of the filtrate indicated that the substance is a true toxin, capable of forming an antitoxin.

The discovery of this specific toxin offered a scientific foundation for:

(1) The recognition of scarlet fever streptococci;

(2) The development of a skin test for susceptibility;

(3) Preventive immunization; and

(4) The production of an antitoxin.

The two strains of streptococci that had caused experimental scarlet fever differed culturally, and were not agglutinated by the same immune serum; but they had in common, the property of producing the specific toxin.

Up to the present time, there has been no satisfactory method of identifying scarlet fever streptococci. Since the recognition of the specificity of the agglutination test, with its application to the diagnosis of typhoid fever, many observations have been made on the agglutination of streptococci in relation to scarlet fever.

It has not infrequently happened that investigators have concluded from the results, in a comparatively small series, that they had found a specific agglutination. But, on further work, they have modified their conclusions to agree with those of other observers; which indicated that most, but not all, of the streptococci associated with scarlet fever are agglutinated by the same serum.

In 1920, Tunnicliff and Dochez and Bliss concluded that the hemolytic streptococci found in scarlet fever may be distinguished from others by means of the agglutination test. More recently Dochez has reported that he is not able to obtain agglutination in more than 75 to 80 per cent of scarlet fever cases.

His last figures are more in accord with our results on immune reactions, published in 1916, and with those of earlier investigators.

They indicate that the agglutination test is not a reliable means of identifying scarlet fever streptococci. No serum agglutinates specifically streptococci from all cases of scarlet fever. Certain strains cannot be tested because of spontaneous agglutination, and agglutination of streptococci from other sources is not uncommon.

A study of the toxin production of hemolytic streptococci offers a more hopeful means of identifying those organisms that are capable of causing scarlet fever. This is accomplished by means of skin tests with filtered broth cultures. If a toxin is found, it must be shown that it is neutralized by convalescent serum or by antitoxin before the organism is classed as a scarlet fever streptococcus.

For some years, there has been discussion as to whether scarlet fever patients with discharging, suppurative lesions should be quarantined until all discharges are stopped; or whether these lesions should be regarded as due to secondary invaders, and the patient released at the end of the usual period of quarantine.

Since hemolytic streptococci are present in the discharges, and scarlet fever is now known to be caused by hemolytic streptococci, the question narrows to a determination as to whether or not the organisms present in the suppurative lesions are the primary invaders, or some different, and non-specific type of streptococcus. This may be decided by testing them for specific toxin production. We have had an opportunity to test a small series of hemolytic streptococci iso-

lated from suppurative lesions in scarlet fever, and found them to be specific toxin producers.

Dilute solutions of the toxin are employed in skin tests to determine susceptibility to the scarlet fever. The toxin is first carefully standardized on human beings; for laboratory animals are so insusceptible as to be useless for this purpose. The toxin is then diluted so that 0.1 mil represents a skin test dose. This exact dose is injected intradermally on the flexor surface of the forearm at the junction of the upper and middle thirds. The reaction is observed in a bright light, not earlier than 22 hours, and not later than 24 hours after the test is made. An area of reddening 1 centimeter or over in any diameter constitutes some degree of a positive reaction. An area of reddening less than one centimeter in diameter, or no reddening at all is a negative skin test.

There is every possible degree of immunity to scarlet fever. And to determine the degree of immunity which affords protection from the disease, and arrive at the proper skin test dose required about one year.

Skin tests were first made with various dilutions of the toxin on a series of convalescent scarlet fever patients. The largest amount of toxin that gave negative skin tests in these immune persons was determined. Skin tests were then made on a series of persons who gave no history of scarlet fever, and the smallest amount of toxin that gave positive tests in susceptible persons was thus found. The proper skin test dose lay somewhere between these two amounts.

Skin tests were then made on persons who had been recently exposed to scarlet fever, or were soon to be exposed. These tests were made with a series of dilutions ranging between the maximum and minimum already determined. Detailed descriptions of the reactions with each dilution were recorded, and the persons who had been tested were observed closely during the time of their exposure. Some of this group contracted scarlet fever, and we were thus enabled to decide the skin test dose that gave reactions indicative of susceptibility.

Highly susceptible persons may give positive reactions with a fraction of the skin test dose, and highly immune individuals may give negative reactions with 150 times the usual dose.

No person with a negative skin test has developed scarlet fever on exposure; while 12 cases of scarlet fever in persons known to have positive skin reactions have come under our observation.

In our first series of skin tests, reported about one year ago, we found positive, or strongly positive, reactions in 41.6 per cent of the persons who gave no history of scarlet fever; and negative, or only slightly positive reactions in all of the convalescent scarlet fever patients tested.

Having found a means of determining susceptibility, we began the preventive immunization of susceptible persons.

Previous attempts had been made to prevent scarlet fever with vaccines. The most extensive use of this method was made in Russia. The procedure was introduced by Gabritschewsky in 1905. The vaccine was prepared from broth cultures of hemolytic streptococci isolated from scarlet fever. These cultures were heated at 60 degrees, and preserved with 0.5 per cent carbolic acid. Three subcutaneous injections were given. Altogether, this method was employed in about 50,000 cases. Mild attacks of scarlet fever with rashes, either local or general, were described following administration of the vaccine.

In the light of our present knowledge of scarlet fever toxin, it seems probable that this toxin was present in the broth cultures used in the preparation of Gabritschewsky's vaccine. So that, while they believed their results to be due to killed streptococci, the rashes described, and any immunity obtained may have been due to toxin, unwittingly injected along with the streptococci.

In any large series of skin tests, there will be found a group of clearly negative reactions; another group of definitely positive reactions; and a third group of slightly positive tests.

The persons who show negative skin tests do not require immunization. We are immunizing all those who show any degree of a positive reaction. The persons with slightly positive reaction may have sufficient immunity to protect them from an attack of scarlet fever that would be recognized clinically, but that they may acquire a mild form of the disease is shown by the fact that they sometimes complain of sore throat after exposure to scarlet fever. And during this attack of sore throat, the skin test may become entirely negative. From a public health point of view, it is most important to completely immunize persons with slightly positive skin tests. For the mild type of scarlet fever that they develop frequently escapes recognition and quarantine.

The preventive immunization consists of three

doses of toxin, given at five to seven day intervals.

Following immunization, a skin test should be made to determine the degree of immunity that has been obtained.

A type of reaction frequently found after immunization is one that appears quickly, but fades within twenty-four hours, and is therefore, negative.

If the skin test is still positive after three doses of toxin, the third dose should be repeated or a larger dose may be given.

Experience has shown that immunization must be carried to the point of a negative skin test.

We have observed no harmful action of the toxin following its use in skin test, or immunizing amounts. Accuracy in standardization of the skin test dose is extremely important, for any error in this is multiplied several thousand times in the immunizing doses.

Prevention of scarlet fever, after exposure, is more complicated. In case of definite exposure, skin tests are made as soon as possible, and at the same time, a culture of the throat is made on blood agar plates.

If the skin test is negative, nothing more is done.

In those with positive skin tests, the next step depends on the throat culture. If the plates show no hemolytic streptococci, and further exposure can be avoided, active immunization is carried out with three doses of toxin.

If the throat culture shows hemoyltic streptococci, passive immunization is accomplished by injection of convalescent scarlet fever serum, or concentrated scarlet fever antitoxin. We use convalescent serum, when it is available, to avoid sensitization to horse serum.

The passive immunity is transient. It does not protect for more than a few weeks.

These preventive measures have been carried out in a series of 465 persons exposed to scarlet fever; 235 of this series were nurses in contagious disease hospitals who were tested and immunized before exposure.

Two hundred and thirty were children who were not seen until after exposure. Twelve of the children with positive skin tests showed hemolytic streptococci in their throat cultures. They received convalescent serum. Five already had sore throats and fever at the time they received the serum.

None of these 465 persons exposed to scarlet fever developed the disease.

Controls were afforded by forty-two nurses and interns on whom skin tests were not made, and by two nurses who were exposed before their immunization was completed. Nine of this control series contracted scarlet fever.

The toxic element of scarlet fever has long been recognized by clinicians. Variation in degree of toxemia has served as a basis for the differentiation of clinical types. Thus, Osler, in describing the fulminant toxic type, wrote:

> "With all the characteristics of an acute intoxication, the patient is overwhelmed by the intensity of the poison, and may die within twenty-four or thirty-six hours."

When the use of convalescent serum in the treatment of scarlet fever became general, it was learned that it is the severe, toxic type in which it is the most useful; and that the symptoms most benefited are those commonly attributed to the toxemia.

In 1895, Marmorek obtained an antistreptococcic serum by immunizing horses with living streptococci. This serum was not produced with a view to its use in scarlet fever alone, but with the idea that it would be useful in all streptococcus infections.

Since then many antistreptococcic sera have been prepared for use in scarlet fever. Of these sera, the one most widely used was that described by Moser in 1902. Moser immunized horses with living cultures of hemolytic streptococci cultivated from the heart's blood of fatal cases of scarlet fever. He reported a series of cases treated with his serum, and two control series, one treated with Marmorek's serum and one with normal horse serum. There can be little doubt that Moser's serum exerted favorable influence on the rash, temperature, and general condition in many cases of scarlet fever.

The antistreptococcic serum described by Dochez and Sherman in 1924 was also obtained by immunizing horses with living streptococci isolated from scarlet fever. The method of immunization differed in detail from that employed by Moser in that, while Moser injected serum broth cultures of the streptococci, Dochez and Sherman used agar cultures. No attempt was made to concentrate any of these antistreptococcic sera.

It has been necessary to employ all of them in large doses, up to 100 and even 200 mils. This use of unconcentrated serum results in frequent and severe serum reactions. It was on ac-

count of these reactions, to which some deaths had been attributed, that the use of Moser's serum was gradually abandoned.

If horses are immunized by subcutaneous injections of gradually increasing doses of sterile scarlet fever toxin, they produce an antitoxin capable of neutralizing the toxin.

This serum is concentrated by the same method employed for the concentration of other antitoxic sera.

The resulting product is of high potency, and the serum reactions that it causes are so few and mild that they do not interfere with its routine use in the treatment of scarlet fever, or with its prophylactic use when convalescent serum is not available.

The antitoxin is standardized against the toxin by mixing equal volumes of various dilutions with known dilutions of the toxin and using the skin test as an indicator of complete neutralization.

We have found that an amount of toxin corresponding to 1,000 skin test doses injected into a susceptible adult, without any preliminary immunization, is capable of producing malaise, nausea, vomiting, and a generalized scarlatinal rash, with a temperature as high as 101° by mouth.

We have taken the amount of antitoxin required to neutralize 1,000 skin test doses of toxin as a basis for the therapeutic dose.

A serum may be readily produced of such potency that 1 mil neutralizes from one to five times this amount of toxin which produces symptoms of scarlet fever including the rash in susceptible adults.

We have employed the concentrated antitoxin in the more severe cases admitted to the Durand Hospital, and found that it produces a definite fading of the rash within twenty-four hours, and a striking improvement in the toxic symptoms. The temperature falls and the swelling and exudate in the throat diminish. So that the antitoxin may be said to remove the toxic element of the disease, including rash.

The subsequent course depends on the local infection in the nose and throat. The sinuses, glands, and ears are frequently involved early in the disease. After enough antitoxin has been given to relieve the patient of the necessity for combating the toxemia, these local complications should receive careful attention.

One effect of removing the toxic element of the disease by means of antitoxin is to unmask such complications as already exist, making their recognition and proper treatment more certain.

We have had an opportunity to give the antitoxin in a few cases in which the urine showed large amounts of albumin during the acute stage of the disease. Following administration of the antitoxin, the albumin disappeared from the urine, and did not reappear.

The renal involvement in scarlet fever is of two types: the albuminuria, with occasional casts, common during the toxic stage of the disease, which usually disappears with the fever; and the late nephritis that appears during the second to the fourth week, after the acute symptoms have subsided. We were able to show, in our earlier work on the bacteriology of scarlet fever, that bacteria are frequently found in catheterized urine from cases of scarlatinal nephritis, and that they may sometimes be cultivated from the kidneys post mortem. The hemolytic streptococcus has been demonstrated in the urine and kidneys of scarlet fever patients frequently enough to suggest that the nephritis that develops during convalescence may be due to localization of streptococci in the kidney.

Our antitoxin series is composed of the more severe cases admitted to the hospital. Thus far one death has occurred in it. This death was due to a neglected mastoid infection.

The control series is made up of the cases that seemed mild at the onset. There have been three deaths in this series; two with pneumonia and one with toxemia.

Scarlet fever throughout the country has been mild for several years. The low death rate from this disease shows that not many lives will be actually saved by any serum.

Because complications may occur so early in scarlet fever, and the damage done is to be estimated not so much in the number of deaths as in the after effects, the importance of preventive immunization is apparent.

Discussion follows paper of Dr. Rucker, page 241.

THE MANAGEMENT OF SCARLET FEVER*

By OLIVER W. HILL, M.D.,
Knoxville, Tenn.

The physician heals; Nature makes well.—Aristotle.

Scarlet fever is a communicable disease. In a typical case there is fever, sore throat, nausea and vomiting, followed in from 24 to 48 hours by a definite inflammation of the skin, causing the characteristic red rash. It is well to remember that some cases are so mild as to have a train of symtoms, lacking in so many characteristic signs that they may pass unnoticed. It appears certain that scarlet fever can be communicated at the very beginning of symptoms and probably during the last few days of incubation.

When scarlet fever exhibits itself in a frank and typical manner, the diagnosis is simple. The presence of all the more important symptoms of the disease constitutes an unmistakable syndrome. Aberrant and extremely mild cases may, however, present difficulties in diagnosis. To me there is no one symptom which is pathognomonic of the disease. The rash, the most conspicuous manifestation and the one which has given the infection its name, is not in itself sufficient, in as much as an almost identical exanthema may occur in other diseases. The rash extinction test is still rather uncertain, as it depends on so many variable factors. It can hardly be conclusive evidence, if negative. It is then seen that a diagnosis must be based upon an association of symptoms and from a consideration of the disease in all its aspects.

Harris and Gilhespy, in some studies of scarlet fever at the Birmingham City Hospital, are led to state that scarlet fever is at present, a comparatively mild disease; the mortality having decreased in the last 15 years, from 3 to 1 per cent. Other workers have been led to the observation that scarlet fever does not seem so severe as it was at one time. The New Haven Health Department reports for the first quarter of 1924, 197 cases with 2 deaths, or about 1 per cent mortality. From January to November inclusive, the Board of Health of Knoxville reports 113 cases with 2 deaths.

Like most acute infectious diseases, scarlatina is a disease that occurs more frequently through the school age than it does in infancy. During the first year of life, it is relatively rare except as it is incident to a house epidemic. It of course becomes more frequent as the child is more exposed by being in contact with his fellows at play and at school.

Vomiting is a usual symptom of scarlet fever even in milder cases. In more serious cases, the emesis may be protracted and exhausting. In the toxic group, the vomiting is almost continuous and often alarming. This is best controlled by bicarbonate of soda gr. XV, (¼ teaspoonful) to glass of water, rest in bed with as quiet surroundings as possible, and in extreme cases, gastric lavage.

The child of course, should be put to bed in a room as much isolated as is possible, keeping other members of the family free from contact with the infection. All eating utensils should be carefully boiled each time used. All food left over should be burned and the excreta carefully disposed of. A few minutes spent in making clear just what you are attempting, is well worth while, as it will prevent many mistakes of ignorance and encourage cooperation on the part of the family and attendant. In mild cases, no particular treatment is needed other than the usually hygienic measures. The diet should be easily digestible and of sufficient quantity for the child's nutritional needs. Unless there is some special contra-indication, a very liberal diet, including carbohydrates, egg or meat may be allowed, as it is essential that the caloric requirements of the patient be fully met.

The treatment of scarlet fever contemplates such measures as will apply to any patient suffering from an acute infectious disease. In most cases, the fever is readily controlled by proper sponging. There is no objection to the use of immersion baths when properly given; and when hyperpyrexia is a feature, cold packs are of great value. When the patient becomes toxic, or has cardiac complications, mustard packs are beneficial.

Of the laxatives, milk of magnesia we have found to be the most useful. It combines its slight laxative and alkalin properties with its hygroscopic action on the bowel, producing a slight watery purge, thus relieving the kidney of some of its work. It must be given in sufficiently large doses to be effective. The dose varies from 1 to 4 teaspoonfuls a day, depending on the individual.

*Read in Symposium on Scarlet Fever, Joint Session of the Section on Pediatrics, Section on Pathology and Section on Public Health, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

This year (1924), Dochez and Sherman described an antistreptococcic serum for use in scarlet fever. This serum was obtained by immunizing horses with living cultures of hemolytic streptococci isolated from scarlet fever. Dick and Dick suggest that concentrated scarlet fever antitoxin may be employed in passive immunization when convalescent serum is not available. They are now using their antitoxin in the treatment of scarlet fever, but have made no claims as to its therapeutic value, saying that it will be necessary to wait until the results of its use in a large series of carefully controlled cases are available. Of course the ideal is for the patient to be immunized by administration of the toxin as described by Dick and others.

Pyrexia is a constant phenomenon of this disease, but in some of the milder cases it is so transient that it may be easily overlooked. The fever which usually ranges from 102 to 104° begins very abruptly, maintains a fairly constant level for some days and drops by lysis. The temperature should not be interfered with so long as the patient is fairly comfortable. In an ordinary case, the temperature range will be influenced by the amount of ulceration and infection in the throat. In the fatal, toxic cases there is usually hyperpyrexia, but occasionally the disease may run an apyrectic course, especially when there is hemorrhage or the child has a very low resistance to infection. The usual teaching that the pulse rate of scarlet fever is out of proportion to the temperature, does not accord with my observations. The pulse of infants and young children varies both as to volume and as to time, and in many disturbances, it is, therefore, of little diagnostic value.

There has been some work done with mercurochrome intravenously, with some favorable reports. Personally I have had no experience with it. In a very septic case it would seem to be ideal and should be tried.

In the stage of desquamation, a simple ointment containing phenol or salicylic acid, or both, with zinc oxid, gives relief from itching and adds much to the comfort of the patient. Cresol, 1 teaspoonful to the gallon of water, is very effective also.

The care of the pharynx and mouth is very important, as it not only adds much to the comfort of the patient, but also tends to inhibit complications. In this region, the most common complication is adenitis.

We employ a cleansing alkalin gargle or wash, every few hours or once or twice a day, depending on the severity of the infection, and apply silver nitrate in a 10 per cent solution, or some other silver salt. This should of course, be done by the physician or a well trained attendant. Care must be exercised to prevent any of the solution from dropping into the larynx, as it causes some very alarming symptoms. In mild cases, this procedure is sufficient. In the anginal forms, we have involvement from an intense reddening of the entire fauces with swelling, to a process severe enough to produce sloughing. When the faucial symptoms are slight, the adenitis is slight.

Adenitis in some degree is almost always present. When it assumes any proportions, cold applications in the form of an ice collar or cold compresses, act well. Of course, when suppuration is apparently inevitable, hot applications act better to hasten such a process. When liquefaction has fully developed, evacuation should be made through the smallest effective incision. A large incision many times causes large sloughs when the tissue resistance is low, and is no more effective in this instance.

Otitis, another common complication, often causes much discomfort and may, by involvement of the mastoid, cause a serious train of symptoms. There should be daily routine examinations of the ear, being sure that a clear view of the drum membrane is obtained. When there is any sudden rise of temperature the ear should be carefully examined. The treatment of course, is thorough cleansing and early incision if there is any bulging. The after treatment is the same as any other ear infection.

The kidneys should be carefully watched by frequent urinalyses, observing as far as possible if sufficient quantity is eliminated in 24 hours, especially after five or six days. Scanty urination is the first sign of kidney dysfunction. It is well to instruct the attendant along these lines. The urine should be examined for at least 30 days after all symptoms have disappeared. Space forbids the further discussion of nephritis, other than to state that the management is practically the same as for nephritis from other causes.

Rheumatism from scarlet fever disappears without treatment. Rest and bland diet with the salicylate gives relief to symptoms.

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511 West Church Avenue.

Discussion follows paper of Dr. Rucker, page 241.

SCARLET FEVER AND PUBLIC HEALTH*

By W. C. RUCKER, M.S., M.D., GR.P.H.,
Surgeon, U. S. Public Health Service,
New Orleans, La.

The symposium this morning is interesting and valuable not only because of the subject under discussion, but also because the question is considered from three widely divergent angles. The first of these has to do with research, the attempt to discover those basic facts upon which the practitioner of medicine and the sanitarian may attack the disease at the bedside and in the community. The second paper has to do with the individual patient and concerns itself with the therapeutic measures which are to be employed in the prevention of death and the avoidance of sequalae. The third contemplates the question from the viewpoint of mass sanitation, i. e., from the angle of the protection of the health of large groups of people.

The mortality tables of scarlet fever are deceptive. In the registration area for the years 1920, 1921 and 1922 the number of reported deaths was 4,004, 4,718 and 3,256 respectively. For the same years the rate per 100,000 was 4.6, 5.3 and 3.6 and the percentage of the whole number of deaths was 0.4, 0.5 and 0.3 per cent. In other words, during the years in question the deaths from scarlet fever about equaled homicides from firearms and were about half those from automobile accidents. Judged on these data alone, scarlet fever would not constitute a major health menace.

Such, however, is not the case. The fatality percentages in scarlet fever are subject to wide variations depending upon the type of disease but 3.5 per cent may for the sake of this argument be taken as a fair general average. On this basis, it is safe to estimate that there were 114,400 recognized cases in 1920, 135,000 in 1921 and 93,000 in 1922, hence it may be assumed that during these three years there were approximately 350,000 cases of scarlet fever in the registration area. Viewed from this angle the important relation of scarlet fever to the public health becomes more apparent.

But it is doubtful if these figures represent the whole picture. There is a great multitude of missed cases, cases in which there is a mild angina but no skin eruption, cases which never reach the practicing physician or which may be diagnosed as a simple angina, cases which are not reported but which serve to keep the infection alive and to become the starting point of severe epidemics. The size of this group is not known but judging from the widespread distribution of the disease it must be very considerable.

Statistics seem to show that at least 90 per cent of the cases occur before the tenth year of life and that most of the deaths are in children under six years of age. Among those who live, the sequelae may be damaging to health and usefulness. Chronic nephritis, chronic valvular disease of the heart, chronic lymphadenitis, deafness, eye affections, multiple neuritis, and mental changes all may, and frequently do, follow in its train, particularly in those cases in which the treatment has been overzealous or injudicious. Not only is the life span shortened by these conditions, but the economic value of the individual is reduced by the lessening of his producing power and the expenses incident to long continued treatment.

Under present conditions, the treatment and isolation of scarlet fever cases results in heavy community losses. The patient must stay in bed for approximately one month in order to prevent the acute nephritis, which exists in practically every case, from becoming chronic, and an additional three weeks period of isolation is frequently undergone. This means approximately fifty days of loss to the patient, his family and attendants. Worse than this, the patient, usually a child just at the basic period of his education, is kept away from school and must either continue in his class under a handicap or lose a year of his school life which at best is none too long. Under a system of quarantine which does not recognize the fact that immune persons rarely spread scarlet fever, other children in the family may similarly have their schooling interfered with.

*Read in Symposium on Scarlet Fever, Joint Session of the Section on Pediatrics, Section on Pathology and Section on Public Health, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

All of these facts demonstrate the serious effect of scarlet fever upon the public health. Expressed in money terms, this amounts to an annual loss which runs into the millions. In terms of human suffering it is beyond computation.

Passing from the more general considerations of the public health hazards of scarlet fever to its epidemiology, one is struck with the fact that it is essentially a disease of children less than ten years of age, the bulk of the cases occurring about the sixth or seventh year of life. Infants seem to be relatively immune and it is not until the child begins to get out of the home and to come into contact with other people that the disease has its greatest incidence. It has long been known that scarlet fever is not generally a disease of adults and in the health protection of troops, scarlet fever seldom constitutes a serious or troublesome menace.

In this particular, scarlet fever behaves very differently from measles or typhoid fever or smallpox, all of which are liable to break out epidemically when large numbers of adults are brought into close contact with one another. Reasoning by analogy, it may be deduced that since scarlet fever does not behave in this way it is because the great bulk of the population has acquired an immunity to the disease before reaching adult life. If such be the case, it is evident that scarlet fever is a far more prevalent infection than we have heretofore thought it to be and that the bulk of the cases are not characterized by an exanthem. Thanks to the Dicks we are now placed in possession of a means of determining whether or not these deductions are accurate, and, if they are, we are brought face to face with the necessity for revising very considerably our previous conceptions regarding the symptomology of the disease.

The disease is almost universal in its geographical distribution but it is less frequent and less serious in the warm tropics. It is most prevalent in colder climates and during the colder months, probably because children are brought into closer contact then, because the schools are open during the colder months of the year. In a rough way, the scarlet fever curve seems to follow the time when schools are in session.

You have already listened to the results obtained by the Doctors Dick in their studies of the etiology of the disease. I think that we Americans are inclined to the belief that they have established the hemolytic streptococcus as the causal agent of the disease. On the other hand, several Italian observers have described as etiological an organism which is totally different. From the viewpoint of public health, this divergence of views is of extreme importance because on it will depend in future a good many of the measures which we will have to put in force for the control of the disease. This is important not only from the viewpoint of diagnosis but also from that of prophylaxis and control, especially in view of the fact that the Italians claim that their organism exists in the scales. However, the organism they describe is filterable and does not seem to have been proven the causal agent of scarlet fever.

The disease is spread by promiscuity, overcrowding and direct and indirect contact, the latter perhaps through the use of freshly contaminated articles. Ingestion of the organism, for example, in milk, is another means of spread. The vector of the causal organism may be air, food and freshly contaminated articles, but the great agents in its spread are missed cases. The portal of exit is through the mouth and nostrils and, if we are to believe the Italian observers, through the skin also, but the production of the eruption and the desquamation by the injection of sterile toxin as described by the Doctors Dick indicates that the causal agent does not leave the body through the skin. The period of incubation is from one to seven days, oftenest from two to four and the period of invasion is very short, usually only a few hours.

The period of infectiousness is the subject of wide debate. It is of the utmost importance that this question be settled since upon the definite knowledge of how long scarlet fever cases are infectious depends the length of the quarantine. If, in uncomplicated cases, the patient becomes non-infectious after the appearance of the rash, it will be possible to shorten very materially the period of quarantine. I think it is pretty generally agreed that so long as a pathological discharge exists the case should be regarded as infectious, until by a bacteriological test it has been proven otherwise. The question of whether or not the scales may act as agents of spreading the disease is of great moment. If the Italian observers are correct, they may. If they are not, it is highly probable that the scales do not act as a factor in the propagation of scarlet fever. I have never been able to accept the view that the scales are dangerous. Certainly if they are, the disease is at wide variance with most diseases, with the exception of smallpox and chickenpox. Here, too, enters in the question of fomites. A consider-

able number of cases are reported in the literature in which apparently the disease was spread through the intermediation of clothing, bedding and books. Also cases have been reported in which the disease was apparently carried from the sick to the well by the clothing or the person of the attending physician. I have never been able to convince myself as to the accuracy of these observations, but granted for the sake of argument that they do occur, I cannot conceive that they play any great role in the spread of disease and the causation of epidemics. Considerable experimental work should be done in order to determine the exact manner in which scarlet fever is spread, since without accurate knowledge of this sort, it will be impossible for the public health worker to carry on active and efficient measures for the control of the disease.

Typical cases of scarlet fever are easy to diagnose. The light cases, those in which there is only a passing sore throat with mild depression, are extremely difficult. More depends, from the viewpoint of control, upon the correct diagnosis of the disease than upon any other single factor and it is in this particular that the practitioner of medicine should be of the greatest assistance to the public health worker. Every severe sore throat should be considered as suggestive of scarlet fever, and treated accordingly. Until our diagnostic methods are improved to the point where the very light and atypical cases may be accurately recognized, it cannot be required that such cases be reported to the health authorities. Nevertheless, it is the duty of the practitioner to be on the lookout for such cases in order that a differential diagnosis may be made by the laboratory. Every case in which there is an exanthem should be promptly reported.

The control of scarlet fever is not on a very satisfactory basis. Until now, if the measures for the prevention of the spread of the disease by the control of milk be left out of account, our great reliance has been isolation. In many instances this has been a blundering, cruel, expensive method. In the administration of matters which touch acutely upon the lives of many people, overzeal may be quite as harmful as apathy and the application of a ruthless quarantine is at once the evidence of our ignorance and of our lack of faith in our ability. Too frequently the hardships which we inflict in our efforts to control the spread of scarlet fever are almost as great as those caused by the disease itself and they serve to tear down the confidence which we have so laboriously built up in the community mind. Certainly the patient should be surrounded with a complete sanitary asepsis but to quarantine the wage earner and other adults of the family is not wholly justifiable now that we are in possession of a method whereby we can differentiate accurately between immunes and non-immunes. It is hardly probable that immunes will act as agents of spread and to quarantine them is therefore not logical. To interfere with the schooling of an immune child because of the presence of a case of scarlet fever in his home is not justified.

So far as the general control of the disease is concerned, we have hitherto been groping in the dark. Now by means of the Dick test, it is possible to determine the non-immunes and to immunize them. It might be held as a sad commentary on the state of our advancement that we must now make children undergo immunization against smallpox, typhoid fever, diphtheria and scarlet fever, but in this we are but imitating Nature which protects adults by sickening children. Children should therefore be immunized against scarlet fever and if every child of school age were so protected, scarlet fever would soon become a *rara avis in terrae*. There would still remain the carrier to be dealt with but with an immune population he could do no harm. I am not convinced, however, that carriers exist and believe that it is the missed case that keeps the disease alive.

My thesis has been to prove that scarlet fever is a serious menace to public health in its widest sense and to point out that the newer researches have placed in the hands of sanitarians new weapons for the defense of little children as well as for their cure when they are attacked by the disease. Therefore, this is a message of hope for the future and of fresh victories over man's arch enemy, disease.

DISCUSSION (Abstract)

SYMPOSIUM ON SCARLET FEVER

Papers of Drs. Dick, Dr. Hill and Dr. Rucker

Dr. Arthur I. Kendall, St. Louis, Mo.—The work of Doctors Dick has thrown a flood of light on a disease which has been both puzzling, and a menace to man. They have isolated an organism from an undoubted case of scarlet fever, have inoculated the organism into human volunteer subjects, reproducing in them all the signs and symptoms of scarlet fever, and have recovered the organism again. This fulfills all the exacting postulates of Koch. They have recovered from filtrates of their organisms a poisonous principle which, when injected into men, induces a qualitative and quantitative reaction indicative of susceptibility to scarlet fever. This should be known as the Dick reaction, precisely as the reaction of the diphtheria bacillus is known as the Schick reaction. They have produced immunity, or

a very decided degree of tolerance to infection with the scarlet fever microbe with properly graduated injections of this poison, and it seems probable that in time they will obtain, if they have not already obtained, an antitoxic serum which shall be of great curative value.

Like all pioneer work, this series of investigations brings to light many problems, as well as answering many questions; it opens new avenues of thought, and perhaps of investigation for the group of the exanthemata, and it paves the way for many new studies.

Dr. H. E. Robertson, Rochester, Minn.—Some hundred years ago Erasmus Darwin, the grandfather of Charles Darwin, wrote: "No one could do a greater service to humanity than by teaching how to inoculate this fatal disease." He was speaking of scarlet fever. This world has waited a long, long time for this event and the welcome we give it hardly seems to be in accord with what it deserves. There are three great outstanding discoveries in medicine made in North America. One was Theobald Smith's demonstration of the transmission of parasites by intermediate hosts; the second was the discovery by Banting and Best of insulin and its use in diabetes; the third is this discovery by the Doctors Dick.

There are many evidences which convince us that there are other forms of the streptococcus which perhaps are just as specific for their diseases as the scarlet fever streptococcus is for its disease. All of you, for example, have perhaps had experience with that tremendously disturbing type, the parotitis streptococcus. There is a type seen in bronchopneumonia, in cholecystitis, ulcer of the stomach and duodenum, salpingitis, and a host of other diseases in which the streptococcus plays an important part. Suppose some other Doctors Dick discovered how to control these. The world would be a hygienic paradise, so to speak, because man would not fear organisms which, I venture to say, account for 75 per cent or at least complicate 75 per cent of all sick people.

Dr. Frank Leech, Washington, D. C.—While definite standardization has not yet been attained in this serum, at the same time it is being worked out now in various portions of the country under the direction of the Hygienic Laboratory, and I believe it is only a matter of a short time before this will be accomplished. Then we shall have a remedy which will be quite the equal of the toxin for diphtheria, for testing susceptibility and for immunization, and have an antitoxin for the cure of the disease.

In Washington, at the Garfield and the Children's Hospitals, under the direction of the Hygienic Laboratory, Drs. Lindsay, Rice and Selinger, have been carrying on this work through the courtesy of some of the biological laboratories in letting us have the scarlet fever toxin and antitoxin, and the results have been practically identical with those of the Doctors Dick.

I have been very much impressed with one series of three cases in which this was used, showing to my mind, that it was not necessary to have a rash in scarlet fever. We all know there is nothing more difficult to diagnose, as Dr. Rucker pointed out a few minutes ago, than these mild cases of scarlet fever. The first of these three cases was a child who had a clinical case of scarlet fever and gave on the first day a slightly positive Dick test. The test was slightly positive on the second day, but negative on the third. The mother had sore throat and slight fever, but no rash whatsoever, and showed a positive Dick test and three days later a negative. The father came down with a typical clinical case which ran the same course as in the child.

In about sixty nurses in whom the test was used, the percentage of positive toxin skin reactions was much greater in those who had not previously had duty in the scarlet fever wards.

Dr. A. J. Waring, Savannah, Ga.—It looks very much as though the citadel of the exanthemata has finally had a breach made therein. For years the exanthemata have been a bugbear to the medical profession. As a member of that particular branch, the pediatric division, I wish also to add my great praise and express the great appreciation that we all entertain for the work that has been done.

Several years ago when I was in the Army we had at General Hospital No. 9, at Lakewood, N. J., an outbreak of scarlet fever. We became tremendously interested in this outbreak because it was preceded by septic sore throat. The hemolytic streptococcus was in evidence in abundance during this outbreak. Then came the epidemic of clinical scarlet fever. We could find no explanation for it although we investigated the milk supply and all means of ingress into and egress from the hospital. From the charts we saw that cases broke out all over the hospital without any apparent method of contact or transmission. Another factor was that we had no control of the epidemic. In spite of all the measures we could use it kept breaking out for quite a long time. One day my associate picked up a soldier with a typical scarlatinal eruption. Nothing apparently was wrong with him except his very distinct scarlatinal rash. On closer physical examination we found on one ankle a small vesicular pustule and a small inguinal node. That was all the pathology he had. His throat was perfectly clear. From the vesicular pustule a pure culture of streptococcus was filtered.

This subject divides itself into three parts: prevention; the control and handling of the disease itself; and convalescence. My procedure since that time in cases of acute nasopharyngitis has been to study cultures from the nose and throat. If any shows hemolytic streptococci I isolate it for at least 72 hours. We all have seen cases without an eruption, or at least with very little. In the hospital service we did not stop the outbreak until cases were released from quarantine by examination of throat cultures. No case was taken from quarantine until the throat was practically clear of hemolytic streptococci and I have used the same procedure in my cases.

The handling of the case more or less resolves into the handling of very severe toxemia. The child is immediately put to bed, no matter how mild the case may seem. Diet is most important. We want to avoid the cardiorenal complications so often seen. Therefore the diet is most important as well as the quantity of fluids and fruit juices. Many seem to regard the scarlet fever patient as a potential nephritic as long as he lives. I use argyrol in the throat. Some of these cases are so toxic that they lie still. From the pediatric standpoint do not let the child lie dormant all the time. I know of no disease in which nursing

is so important. Be on the watch all the time for complications and treat them when they do arise.

Dr. F. J. Underwood, Jackson, Miss.—Scarlet fever is a very expensive disease, one of the most expensive known from the standpoint of time, and it is a great wrecker of vital organs also, especially the kidneys and the heart. We know the history of nephritis in connection with this disease. We have known for some time past that more than fifty per cent of cases of scarlet fever occur between the ages of six and ten. I have a table here, the Dick table, of various ages, which bears out the statement.

The different types of scarlet fever ordinarily met with are the mild, toxic, hemorrhagic and surgical. In the differential diagnosis we have to consider septic sore throat, erysipelas, drug rashes, etc. To have all this made easy at one stroke is a wonderful thing.

Blake and Crest have carried on these experiments with very striking results. The Willard Parker Hospital investigations have been very conclusive, and I believe in the Dick test just as I do in the Schick test, because many thousands of people have been tested and it works splendidly.

Dr. Roy K. Flannagan, Richmond, Va.—This discovery can not be of full value unless the individual medical man in the city and in the country puts it into practice. In my own administrative experience in the field of public health I find that large numbers of doctors are not using the Schick test. It is well to praise this splendid advance, and I think we can not say too much, but are we doing our Schick testing and our toxin-antitoxin work as we should? The material for the Dick test is not on the market yet to any great degree, but let us be ready for its use when the opportunity comes by having prepared our clientele to accept it. The Schick test is the best preparation for the Dick test.

I would like to note here that this discovery was made through human volunteers, much as the yellow fever and malaria work was done through human volunteers. I hope that the names of these volunteer nurses who gave themselves to the experimentation that has brought about this epoch-making discovery are recorded because they deserve to be remembered throughout time. We know that deaths occurred during the yellow fever work. It so happened that Dr. Dick was more fortunate, and those who submitted to his experimentation survived, but they are not the less heroic for that result.

The boldness of Dr. Dick's work should not be forgotten. Scarlet fever has become mild, apparently, in this country but in Mexico and in Russia and Czechoslovakia it is raging and as bad as ever, and it may later return to us in virulence. Physicians in every day practice must see to it that the children in the homes of our people are tested so that in after years the terrible consequences of scarlet fever may not be apparent in their bodies.

Diphtheria and scarlet fever are now in our hands. What shall we do with them?

Dr. L. von Meysenbug, New Orleans, La.—How long after the third injection of the toxin for immunizing purposes do you do the second Dick test in order to see whether or not the child has become immune? In other words, how long does it take for immunity to become established?

Dr. W. A. Mulherin, Augusta, Ga.—Of what value, from a diagnostic standpoint, are throat cultures, and, if of value, how constant are the positive findings, in scarlet fever, of the hemolytic streptococcus? Also how constant are the findings of hemolytic streptococcus in the pus found in the sequelae in scarlet fever, otitis media, empyema, etc.? Again, what was used in the controlled tests in these children whom we have just seen, exemplifying positive and negative Dicks? How long before the medical profession will have this life-saving serum for preventing and treating scarlet fever? Also, is the serum put out by a certain pharmaceutical house, today, the same as Dick's serum, and does this serum carry the stamp of approval of the Doctors Dick? What safeguard will be thrown around the use of this serum for the protection of the profession and laity?

Dr. George F. Dick (closing).—Both Dr. Hill and Dr. Rucker spoke of the fact that infants below a year of age rarely contract scarlet fever. It is known that skin tests under a year of age are usually negative, which would indicate that the immunity acquired from the mother exists up to about that time.

I was very glad Dr. Hill brought out the point about the necessity of watching the ear from the first and not depending on earache. I think that is very important. Another important point is to open the ear which has indications of the collection of pus behind the drum, and open it early.

Dr. Rucker spoke of his doubt as to whether desquamation from scarlet fever patients would start contagion. Some of the people we have inoculated with scarlet fever streptococci got typical scarlet fever, and others did not have the scarlet fever rash. Several people have spoken of the likelihood of scarlet fever without a rash. I think that must almost surely occur. As to whether the desquamation is contagious or not, you know we said we can produce a scarlet fever rash with the sterile toxin alone, and people with such a rash as that desquamate in some degree. Of course, these scales, this desquamation contain no streptococci, so they would not be a source of infection. On the other hand, one can not say it is not possible, because the scales might become contaminated by the secretion from the nose and mouth. These patients have a good deal of secretion and that becomes spread about the bed and the scales might become infected.

The question was asked, how long after immunizing these people should they be retested to find if they are immune. The whole development of the skin test and the immunity following is a much more rapid process than in diphtheria. For instance, we said these people had to be observed for from twenty to twenty-four hours after the test, instead of forty-eight hours, as in diphtheria. The immunity develops rapidly, too, much more rapidly than in diphtheria. We retest at the end of two weeks.

Some one asked about the value of throat swabs in diagnosis. We think they are of value in this way, when people are or have been exposed to scarlet fever and are anxious to be immunized. If we know that they have been exposed to scarlet fever of course we immunize them with the active immunization, that is, we inject into them a small amount of toxin. Now, if those people already have scarlet fever streptococci in their throats we do not like to inject them at that time, because if they should have scarlet fever we would be blamed for it. So we look into their throats to see that they have not streptococci there, so we may be free to use the toxin. If they are there we inject the antitoxin. Those people then should be immunized again. For instance, one child we had already coming down with scarlet fever, but we gave the convalescent serum and nothing developed, although the child already had streptococci in the throat. We told them that to make the immunity permanent the child would have to be immunized with toxin. This year that child came down with scarlet fever. They had forgotten all about it in the meantime.

There are hemolytic streptococci in the discharges until they cease.

The material with which these things are made, that is the cultures with which we produced experimental scarlet fever, as well as the toxin and antitoxin, we have turned over to the Hygienic Laboratory, in Washington. There has been some toxin on the market but I am told that they have been ordered off, and the manufacturers are being prosecuted for illegal sale by the Attorney General's department. So far as I know now, there is no preparation on the market which we approve.

The blanching test has a good deal of value, though the rash must be fairly well developed to make the contrast plain. The test is made as follows: A small amount of convalescent scarlet fever serum is injected into the skin. If the rash is that of scarlet fever it will be surrounded in a short time, in a number of hours, so that it can be observed the next day, by an area of blanching of the skin. If it is not a scarlet fever rash the skin will not become blanched by the antitoxin. Aside from the fact that it must be used in a well developed rash to get the contrast, and can not be used late in the disease, because the rash is fading then, it is of value.

Serum for use is usually collected three or four weeks after the disease, but may be collected long after that. Usually any one with a negative skin test has enough antitoxin in the blood to make it of value. The best time to get it is about three or four weeks after the disease.

Dr. W. C. Rucker (*closing*).—We have been in the humiliating position, and still are in the humiliating position, of being unable to control the common diseases of childhood. What do we really know about measles today? What do we know about chickenpox? As a matter of fact, what do we really know about smallpox, about whooping cough, about mumps? What we do know could be put on the head of a pin and a lot of room be left around it. It is an inspiration to come here to listen to Dr. Dick.

MEDICINE

INTERNAL DISEASES, PEDIATRICS, NEUROLOGY, DIAGNOSTIC METHODS, ETC.

THE CANCER PROBLEM: SOME OF THE NEWER IDEAS OF TREATMENT BY SURGERY AND RADIATION*

By THOMAS A. GROOVER, M.D.,
Washington, D. C.

Many thoughtful writers decry what they describe as a present day tendency to over-specialization in the practice of medicine. There may be just grounds for such a complaint, but in many instances they are of a sentimental rather than a practical nature. Certainly the history of the past indicates that few of the great scourges of humanity have been successfully combated without organized and highly specialized effort. No one would deny, for instance, that the specialized and intensified effort in combating tuberculosis, both by the individual and by the State, has had aught but a salutary effect.

It is surprising therefore, in spite of certain fundamental differences so far as preventability is concerned, that a similar policy has not been developed with respect to the cancer problem. Until within recent years the only ones who claimed to be cancer experts were the charlatans who preempted the title for purely commercial purposes, and even at present the number who may lay just claim to it are lamentably few, and special institutions for the care of the cancer sufferer are wholly inadequate. There can be no doubt that but little progress is to be expected in the control of cancer without more specialized effort.

Because of certain inherent difficulties as to accuracy of diagnosis, classification, and follow-up, it seems reasonably certain that statistics as to the curability of cancer are of very little value, and probably never will be if individual effort or the general hospital is depended upon to supply them. This is well exemplified by a report of Lee and Cornell[1] on 87 primary operable cases of carcinoma of the breast admitted to the New York Hospital prior to April 1, 1919. They found only 15 per cent of the patients alive and with no evidence of disease at the end of five years. They further found that only one patient of the entire group survived the five-year period where axillary nodes were found involved by the pathologist, and 33 per cent survived where the axillary nodes were not involved. These figures are much lower than any heretofore published. Other surgeons report cures ranging from 22 to 46 per cent, those of Haggard and Douglas (quoted by Lee and Cornell[1]) being among the highest. These very wide discrepancies indicate that no one knows the real truth as to the surgical curability of cancer of the breast, and this is also probably true with respect to all cancers.

The radiologist is prone to base conclusions on "general impressions," while the surgeon bases conclusions on statistics which are in the main sophistical. It is probable that one is about as trustworthy as the other.

The underlying principle governing cancer therapy since ancient times has been based upon the idea of removing all cancer tissue from the body. The knife has been the most commonly used instrument for that purpose and with the elaboration of surgical technic, more and more tissue has been removed with the hope of attaining that objective. The limit in this direction has probably been reached, and little is to be expected from a further elaboration of surgical procedure. Indeed, some surgeons are voicing the opinion that an elaborate and indiscriminate dissection of lymphatic drainage areas in the region of a cancer may be harmful. Quick[2] in a discussion of "Malignant Tumors of the Intra-oral Group," with others, came to make the following conclusions:

"1. The routine block-dissection of the neck in practically all cases of intra-oral carcinoma as generally accepted at the present time is a frantic effort without regard for sacrifices, and does not recognize either the natural history of the disease or the various factors which may modify it in individual cases.

"2. The cervical lymphatics perform a conservative function in the early course of the disease, and to remove them by a routine early block-dissection removes Nature's chief barrier to dissemination, frequently at a time when it is needed most.

"3. An expectant plan of treatment which recognizes the natural history of the disease and the natural

*Read in Last General Session, Symposium on Radiology, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov., 24-27, 1924.

factors of resistance to it, is an approach toward a more scientific solution of the problem and in no way jeopardizes the best interests of the individual case.

"4. A conservative plan of treatment gives promise of reducing practically to a minimum the present operative mortality; of saving patients an appalling number of unnecessary operations, and of saving considerable added suffering following many of these operations."

Herbert J. Paterson[3] speaking before the Section of Surgery of the British Medical Association, voices an opinion similar to that of Quick, above quoted. In discussing cancer of the breast he makes the significant observation that the proportion of those free from recurrence after five years appears to be about the same as it was twenty-five years ago, when the axilla was not cleared out as a routine measure, but only when there was evidence that the glands were diseased. For those who have faith in cancer statistics he publishes figures which support that contention.

One of Paterson's conclusions is that nothing is gained by the removal of adjacent lymph nodes at the time of removal of the primary growth. The nodes are a protective barrier to the spread of cancer cells and only harm is done by removing them. He thinks they may be removed at a later date with much greater safety.

It is fully realized that the views of the authors above quoted do not harmonize with present day surgical opinion or practice, but coming from surgeons of wide experience it possibly presages a reaction from extreme radicalism in the surgical treatment of cancer.

Notwithstanding the generally unsatisfactory results of the surgical treatment of cancer, the knife remained practically without a rival in its treatment until the discovery of x-rays by Roentgen, in 1895. A few years later it was found that these rays had a favorable influence on many types of cancer and that in some, at least, they were capable of effecting a cure. One of the early recognized effects of roentgen rays was their ability to destroy tissue in a manner somewhat analogous to that produced by caustics, but it soon became apparent that they were also capable of influencing the growth and viability of cells without any manifest destructive action, and that different cells varied greatly in their susceptibility to them. This does not necessarily mean that the destructive, autolytic and restraining effects of roentgen or radium rays are independent properties. It is probable that the variation in the effect produced is essentially one of degree rather than of kind, and all are made use of in the practical application of roentgen and radium rays to the treatment of disease. It is probable that the destructive action contributes in a considerable degree to the success obtained in the treatment of superficial cancers, particularly those of the basal cell variety, and this action is also operative in the radium treatment of cancer of the uterus and other tumors where it is possible to bring this substance into intimate contact with the growth by implantation or otherwise. The success attained in the treatment of superficial or accessible tumors led to the hope that some method might be devised whereby a similar dose might with mathematical accuracy be delivered to deeper tumors without doing irreparable injury to healthy structures. From a physical standpoint this has been made possible by the development of the high voltage roentgen technic, and the use of large quantities of radium in the form of packs.

A technic was evolved in Germany whereby it was declared that with the use of high voltage roentgen rays, under certain conditions, it was possible to deliver a lethal dose to cancer cells at any desired depth. This technic, and various modifications of it, have been practiced extensively in this country for the past three years. Results have been accomplished by it which seem to have been superior to those previously obtained, but there is a growing sentiment among roentgenologists that the idea of being able to deliver a lethal dose to malignant processes, regardless of type or location, is wholly misconceived. Many are voicing the opinion that radiotherapy which does not take into account the natural forces of bodily resistance is not only irrational, but in some instances is potential for harm, and that the goal of radiotherapy should be not only to destroy cancer cells and restrain their activity, but to conserve, and if possible activate the natural resistance to cancer invasion. Such views are analogous to those of Quick and Paterson, above quoted, in regard to the surgical treatment of the disease.

It has long been recognized that different tumors vary greatly in their sensibility to radiation. In general this sensibility conforms to the law enunciated by Bergonie and Tribondeau:

"Immature cells and cells in an active state of division are more sensitive to the x-rays than are cells which have already acquired their fixed adult morphological or physiological characters."

Ewing classifies the radiosensibility of tumors as follows:

(1) Lymphoma: lymphocytoma, lymphosarcoma, myeloma.

(2) Embryonal tumors: carcinoma of the testis and ovary, basal cell carcinoma.

(3) Cellular anaplastic adult tumors: round cell carcinoma, diffuse carcinoma.

(4) Desmoplastic tumors: carcinoma simplex, fibrocarcinoma, squamous cell carcinoma.

(5) Adenocarcinoma: adenoma of the uterus, intestine, breast, etc.

(6) Fibroblastic sarcoma: osteosarcoma, neurosarcoma.

It is at once apparent, therefore, that among many factors governing the best plan of attack for malignant growths, that of radiosensibility is a most important one. It will probably be agreed, for instance, that in the first two groups, treatment by radiation alone gives results quite on a par with anything that surgery has to offer, and that in most instances radiation should be given preference. The choice of treatment with respect to the other groups should depend upon a careful consideration of all the circumstances relating to each individual case. Unfortunately, a large number will automatically fall into the group to be treated by radiation because they will already have progressed beyond a stage that renders surgery worse than futile. In this connection, I would emphasize the necessity for a more careful consideration and scrutiny of each individual case with a view to determining the limit of operability. Cases are not infrequently referred to the radiologist for postoperative therapy which have unmistakable evidence of metastases in the lungs, bones and other parts of the body, which were undoubtedly present at the time of operation. As a general rule, patients who are not cured by operation are made worse by it, not only so far as their general well being is concerned, but also with respect to any anticipated benefit from radiotherapy. It is also important for the radiologist to remember that the radiation of cachectic patients is of no benefit, and may hasten a fatal termination.

Another important consideration that may determine the choice of treatment is the operative mortality in certain groups of cases.

Simmons and Daland[4] report that the operative mortality for cancer at the Massachusetts General Hospital in all cases in which a radical operation was done was 14 per cent. The operative mortality in cases in which a laparotomy was performed was 34.6 per cent, and for operations for cancer of the genito-urinary system, the operative mortality was 30 per cent. It would seem difficult to justify surgical intervention, other than for palliation, where a third of the patients die as a result of the operation, unless it could be shown that a considerable number of the remaining two-thirds were cured by it, and it is generally admitted that such is not the case. The substitution of radiotherapy for surgery in certain of these cases would probably increase the average period of longevity and well being, even if it did not contribute to the number of actual cures.

There are, of course, a number of other factors which may in each individual case determine the choice of treatment, but there will still remain a large group in which the question will arise as to the propriety of combining radiation with some surgical procedure, and as to the best method of doing it. As is well known, this has been a more or less routine mode of attack for several years.

In a paper read before the Section on Radiology of this Association two years ago, the writer[5] stated that a combination of two unrelated methods of treatment for any disease did not, as a rule, stand the test of experience, and further expressed the belief that a combination of radiotherapy and surgery in the treatment of cancer would ultimately prove no exception to this rule. There may, of course, be exceptional circumstances where the two might, with propriety, be combined to meet some special indication, but the principle of routinely combining two wholly unrelated remedies, such as radiation and surgery, having the same therapeutic objective, is fundamentally unsound. It is fully realized that specious arguments might be adduced for and against such a contention, but it is questionable if it could be proven by a critical analysis of all the available evidence that a combination of the two methods has increased the sum total of cures. Indeed, it is possible that evidence quite as convincing might be adduced to the contrary. Radiologists admit that they obtain their best and most convincing results in cases that are not treated by any other method. It is somewhat significant that surgeons and radiologists are now fairly well agreed that in the treatment of cancer of the uterus it is best either to irradiate or to operate and not to do both. This conclusion has been made possible by the fact that large numbers of cases have been treated by each method alone and in combination, and the results carefully analyzed

and compared. It is not at all unlikely that a similar conclusion would be reached with respect to all cancers, regardless of location, were they subjected to the same comparative study. If such is the case it is of paramount importance for the surgeon and radiologist to recognize clearly their respective limitations in order that the treatment of a given case may be either elective or selective, as the circumstances may indicate.

The cancer sufferer is indeed fortunate if he falls into the hands of one of discriminating judgment, be he surgeon or radiologist, who is not wedded to any particular method of treatment, but who recognizes the virtues and limitations of each method as related to his particular case.

More frequent conferences of surgeons and radiologist prior to instituting treatment would undoubtedly tend to eliminate a certain amount of unnecessary and possibly harmful surgery, and also a certain amount of unnecessary and possibly harmful radiotherapy.

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DISCUSSION (Abstract)

Dr. Ira H. Lockwood, Kansas City, Mo.—If the treatment of cancer by deep roentgen therapy were merely a matter of physics and measurements, the question would have been settled long ago. It would seem that the American Radiological world has been submitting itself to an invasion by teutonic physicists and radiologists. This Attilic touch is interesting and remarkable, aye, even marketable.

The conservatism of Dr. Daune, of Harvard University, is equally interesting. He has been working on the physical side of the problem with unusual zeal. We venture to reiterate that Americans can afford to await the results of such astute and studious physicists as Daune before they believe all that this foreign invasion promises.

The physical viewpoint of deep therapy and the biological viewpoint are a long way apart. They must come to an agreement before the patient will receive the fair deal to which he is entitled. Beyond the cancer is the cancer patient. What does it profit to cure a malignant condition if the remains of the patient can not enjoy the cure?

Dr. Allen H. Bunce, Atlanta, Ga.—The ideal procedure in the treatment of cancer is that which will give us the greatest number of living patients for the longest period of time. The same treatment cannot be applied to an adenocarcinoma of the breast in a young girl of 16 that would be given to a squamous cell carcinoma of the cervix in a woman of 60.

Let me again emphasize the value of routine examination of all specimens of tissue removed at operation. This has been emphasized a great deal but there are still a very great number of curettements done without any examination of the scrapings. Many tumors of the breast are removed which never receive a pathological examination. We must not make an examination of a patient and overlook a lump in the breast, as is frequently done. The internist, the surgeon, the pathologist, and the radiologist must cooperate to give each patient that form of treatment which will give her the best chance to live the longest period of time.

Dr. Adolph Henriques, New Orleans, La.—Many of us as roentgenologists have served an apprenticeship for years where we dealt with cases which were of the most intractable type, cases that were so far gone that no one would attempt anything for them outside ourselves, often cases that had been operated upon more than once. From the standpoint of the radiologist there is a glimmer of hope about the cancer problem. I have seen, repeatedly, cases which were apparently hopeless respond to treatment. Unquestionably, we can cause an absorption of a malignant process in many cases. We can see from week to week shrinkage of the process until after a while none of it is left. The work of Dr. Ewing shows that with radium and x-ray, measures of response in cancer are called forth, which are specific for these agents. Unquestionably the lymphocytes which are very susceptible to the action of these agents play a part in the care of the growths. Carrel has recently shown that the x-ray and radium will destroy lymphocytes, that these lymphocytes have a double function, not only that of protecting from disease but also that of acting as a nourisher of epithelial and connective tissue. During the process of disintegration of the lymphocytes the connective tissue is nourished. The problem is too big to talk of in detail in a discussion.

THE VALUE OF THE ROENTGEN RAY IN DETERMINING CONDITIONS OF THE APPENDIX*

By ALFRED L. GRAY, M.D.,
McGuire Clinic,
Richmond, Va.

Discussion of the relation of the vermiform appendix to human ailments and of the surgical aspects of appendicitis have been conspicuous for their absence in the programs of medical meetings for a good many years. It is

*Read in Last General Session, Symposium on Radiology, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

with no small degree of trepidation that I come before this Association to present some ideas and observations concerning this little root of all evil, fearing to be adjudged worthy of a resting place beside the dust covered volumes dealing with the various phases of this subject. I shall, therefore, steer clear of as many of these hallowed memories as I can, and at least not try to convince any surgeon that his method of operation can be improved upon, nor any internist that there are any maladies that have not their origin in either the tonsils or the appendix or more probably in both. I shall, however, attempt to establish a relation between certain digestive disturbances and the so-called pathological appendix and to show wherein a roentgenological examination may be of value in detecting appendicular abnormalities.

That the appendix has paid dearly for its existence and has been the innocent cause of much unnecessary abdominal surgery is a fact too generally recognized to admit of argument. Whether the disease is acute, sub-acute, or chronic or whether the appendix presents serious results of disease in one of these forms, the pathological appendix is a menace to health or life. To determine whether such an appendix is present often taxes to the utmost the diagnostic ability of the most skilled specialists.

It is with the purpose of demonstrating the value of roentgen ray examination, as an aid in reaching a correct conclusion that this paper is presented.

ACUTE APPENDICITIS

Let me state with all the emphasis of which I am capable, that no case in which acute appendicitis is suspected should be subjected to a roentgen ray examination by the administration of an opaque meal or enema. The chief reasons for this may be grouped as follows:

(A) Danger to the patient from

(1) Rupture of an appendix already approaching the perforation point.

(2) The well known evil effects of the purgation which is generally required to insure filling of the appendix with the subsequent opaque material.

(3) The presence of insoluble material in the lumen of an appendix may convert a mild catarrhal inflammation into a fulminating type.

(4) Loss of valuable time perhaps with no definite information having been obtained.

(B) Dissatisfaction to the roentgenologist from

(1) Inability to obtain filling and visualization of the appendix on account of lack of previous purgation.

(2) Abdominal rigidity and tenderness preventing palpation.

(3) The severity of the symptoms rendering inadvisable the inversion that is often necessary to release the cecum and appendix from a low position in the lesser pelvis.

(4) The strong probability that from swelling due to congestion none of the meal will enter the lumen.

It is, however, of the utmost importance, in doubtful cases, to exclude the presence of urinary calculi, bone disease, foreign opaque bodies, and if possible, gall bladder disease or gall stones. Examinations for these conditions can usually be made with a fair degree of accuracy without harmful handling, with little discomfort to the patient and without loss of time, care being taken that no abdominal compression is employed.

DISTURBANCE DUE TO NON-ACUTE INVOLVEMENT OF THE APPENDIX

Under this heading one may note the following:

(1) It has been clearly demonstrated in a fairly large number of cases coming under my own observation and that of others that many cases of so-called acidosis in children are due to a pathological appendices, often without any local sign or symptom whatsoever that can be elicited by the usual clinical means, which would tend to indict the appendix (Fig. 1).

(2) There is perhaps no abdominal surgeon, of even a moderate clinical experience, who has not operated for a gall bladder condition and found the gall bladder entirely normal, but upon extending his examination ascertained the presence of a badly diseased appendix, removed it and completely relieved his patient. That the converse is also true is likewise a well recognized fact. No one will deny the frequent similarity that exists in the manifestations of disease in these two organs or the difficulty in determining which is the offender.

(3) Either the gall bladder or appendix, when diseased, may produce symptoms so strongly resembling peptic ulcer that it is impossible by the usual clinical and laboratory means to distinguish between them (Fig. 2).

(4) Many vague gastro-intestinal disturbances, which, for lack of definite knowledge of their true nature, are called "dyspepsia," "gas-

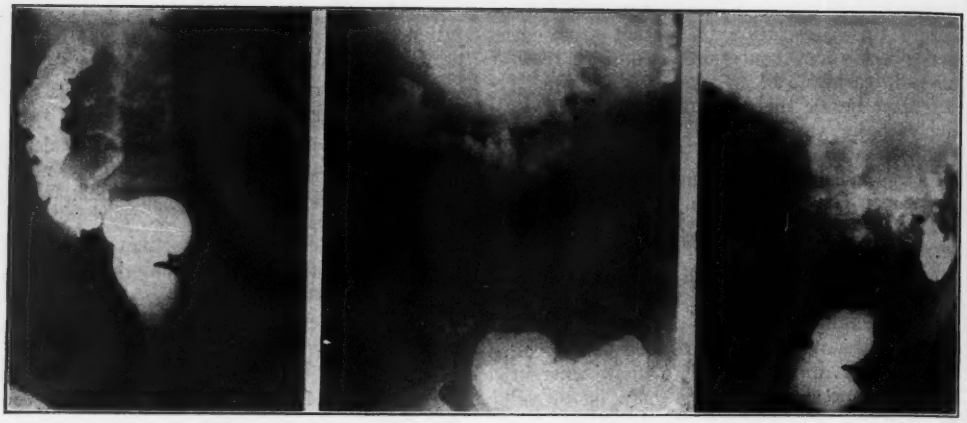

Fig. 1.—Child, age 5. Acidosis for past two years. Markedly dilated appendix, constricted toward its base, showing vacuolation toward its distal end. Verified by operation. Acidosis relieved. No attack to present time.

Fig. 2.—Patient referred with diagnosis of duodenal ulcer. No ulcer found. Examination revealed adherent appendix. Operation verified. Patient relieved of symptoms immediately.

Fig. 3.—Child, age 9 years. Recurrent distressing attacks of urticaria. Tip of appendix fastened in front of first sacral foramen. No tenderness. Diagnosis: chronic appendicitis. Verified by operation. Condition relieved.

tralgia," "biliousness" or "auto-intoxication" (Fig. 3).

Many of our leading pathologists claim never to have seen a perfectly normal appendix, judging by the criteria that are applied to the study of other organs and tissues, and the question is one of degree and stage of involvement, rather than of the presence of manifestation of disease. In the cases forming the basis of this paper I have not considered any appendix abnormal that has not presented macroscopic evidences of disease. When a microscopic study is required to elicit pathology it is probable that it can not be detected by the appearance and behavior of a shadow on a screen or film, and whenever in these cases the roentgen ray diagnosis requires the microscope to prove its correctness such diagnosis is from the standpoint of the roentgenologist, essentially wrong.

Furthermore, it is impossible by roentgen ray methods alone to prove that an appendix is free from disease, and in the absence of positive findings, I limit my report to the statement that there is no evidence to warrant a positive diagnosis of the existence of a pathological appendix. For notwithstanding a very good visualization, with free mobility, normal contour of the shadow, normal emptying, and an entire failure to elicit tenderness, I have seen a badly diseased appendix removed, which unquestionably was the cause of a serious illness that had barely escaped a fatal termination (Fig. 4). While such cases are fortunately, exceedingly rare, it is well to admit their existence and maintain some degree of conservation in attempting to exonerate the appendix from all blame.

In a certain percentage of cases, especially of adults, the roentgenologist fails absolutely to obtain visualization of the appendix by reason of failure to find the opaque material in its lumen. This fact has led to diverse opinions among some of the leading observers. Some maintained that if the appendix permitted material to pass into its lumen from the cecum, it was, of necessity, diseased; others, whose opinions were entitled to equal credence, held that an appendix which did not admit of filling was to be considered pathological. At the present time, however, these extreme views are not widely adhered to and it is generally accepted that the failure to fill is not necessarily of definite significance.

The percentage of cases in which visualization is not obtained varies in the experience of different observers. Perhaps an average of the statements of the authorities available is about 33 1-3 per cent in the general routine of gastro-intestinal examination. This percentage can unquestionably be materially reduced if a technic be pursued with the definite purpose of visualizing the appendix. The wide variation in results reported is doubtless due in part to the differences in composition of opaque meals, to lack of uniformity in the times of observation,

Fig. 4.—Child, age 8 years. Case illustrates inability to exclude appendicitis. Patient suffering from severe attacks of acidosis. X-ray examination revealed appendix apparently normal and not tender. Child suffered at intervals for four years. Was again examined by x-ray with negative report. Appendectomy done when child was nearly moribund and a sub-acutely inflamed appendix removed. No recurrence since operation.

Fig. 5.—Illustrating filling at six hours after meal.

Fig. 6—Same as Fig. 5, twenty-four hours after meal. Appendix empty.

following the administration of the meals, and to dissimilarity in the preparation of the patient for the examination.

TECHNIC OF EXAMINATION

Whenever possible I direct castor oil at bedtime on the night preceding the examination, the dose being usually from 1 to 2 ounces. On the following day, from 14 to 18 hours afterwards, the patient having been denied breakfast, is given a meal consisting of barium sulphate 2 to 4 ounces in 1 pint of buttermilk. I have found malted milk with cocoa syrup a very satisfactory substitute for the buttermilk, especially with children. The stomach and duodenum are examined fluoroscopically at this time.

Six hours afterwards, no other food having been allowed, the first attempt to find the filled appendix is made. At this time there is noted in addition whether there is a gastric residue, the progress of the opaque meal, the appearance and mobility of the terminal ileum and cecum especially as regards kinking, abnormal accumulation or other evidences of adhesion or obstruction. In the examination at this time I have not infrequently been able to obtain a satisfactory filling of the appendix while at the later examination it had entirely emptied itself of the barium content. Usually, however, the appendix is not filled at the six hour period, and if filled, the opaque material in the small intestines greatly interferes by obscuring the shadow of the appendix (Figs. 5 and 6).

The next observation is made from 12 to 18 hours thereafter (20 to 24 hours after the meal has been given) the patient being allowed the usual meals in the interval, but instructed to delay defecation, if possible, until after the third observation. In a majority of instances the cecum is beginning to rid itself of the barium and the appendix will still show its lumen more or less filled with the opaque material.

A second meal given at the 6 hour period will often insure a more complete filling and may prevent the procedure from having to be repeated from the beginning. Occasionally, especially in young children, when the appendix has failed to show satisfactory filling at the third period, a second meal is given 6 to 8 hours thereafter and another observation made in 12 to 14 hours.

I am convinced that many appendices fail of recognition because of their having filled and emptied between the observation periods and if the intervals are shortened, our percentage of failures will be very materially reduced. If it is desired to ascertain how long the appendix retains its contents, further daily observation should be made after the patient has resumed the usual habits of feeding and defecation (Fig. 7).

The search for the barium filled appendix should be made with the patient in the dorsal position on the horizontal roentgenoscope, with knees flexed and the feet planted firmly on the table top so that the abdominal muscles are relaxed and the intestinal coils may be easily ma-

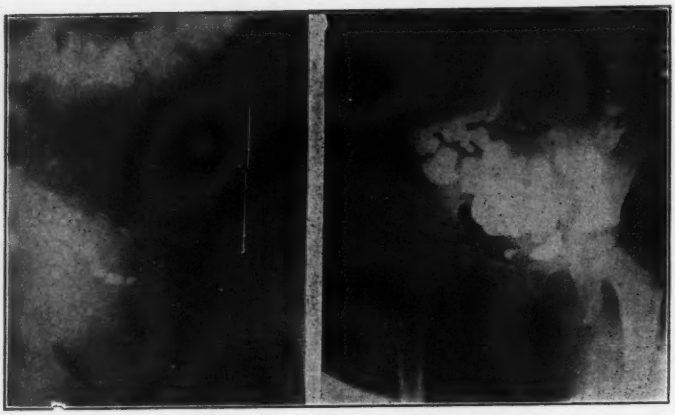

Fig. 7.—Seventy-six hours after barium meal showing marked retention in appendix.

Fig. 8.—Child, age 3½ years. No tenderness. Enormous dilatation of pathological appendix. Operation verified. Symptoms relieved.

nipulated. Not infrequently by rotating the patient, a hidden appendix may be brought into view behind a segment of the filled intestines, especially the cecum and the ascending colon. When the cecum is low in the pelvis it may often be released by having the patient take a deep inspiration and suddenly expel it, the proper pressure being made at the moment of expiration.

In cases of very marked ptosis when the cecum and appendix are imprisoned in the lesser pelvis, by means of the tilt table, complete inversion of the patient may be obtained. By traction upon the ascending colon, the cecum, if not adherent, can practically always be removed, especially if the patient be made to change from the dorsal to the abdominal position while still inverted. When these expedients fail to release the cecum or appendix, one may fairly safely assume that the failure is due to adhesions.

EVIDENCE OF APPENDICAL DISEASE

These may be grouped under two headings: (A), Direct or positive; (B), indirect or presumptive.

The direct evidences may be often strengthened by the presence of the indirect, but one or more of the direct evidences must be present to warrant positive diagnosis. They are:

(1) Abnormalities in the contour of the lumen, such as local dilatations, clubbing of the barium column at its distal extremity, and *constant* constrictions (Fig. 8).

(2) Marked delay in emptying after the contents of the cecum have been expelled.

(3) Abnormal fixation or kinking.

(4) The presence of retained fecal concretions.

(5) Tenderness on pressure which should follow change in location, if the appendix is mobile, or remain at a constant point if the appendix is fixed.

The most important indirect evidences are: (1) pylorospasm; (2) ileal stasis; and (3) spasticity.

Many other evidences of appendical disease have been mentioned by various observers but in my opinion they are too vague and indefinite to be of material clinical importance.

Briefly considering the direct evidences mentioned: First, the presence of sacculation, marked clubbing at the distal end or fixed constrictions can probably not exist except in an appendix the mucous membrane of which has been the seat of a localized inflammatory process, perhaps extending to the sub-mucous and muscular coats and resulting in dilation from loss of tone or secondarily from distention due to a proximal stricture. A stricture may also prevent filling of the distal portion while the proximal end may fill and the appendix will seem too short.

Secondly, the appendix empties normally in about the same time as does the cecum and often while the cecum is still filled. It is perhaps unsafe to pronounce an appendix diseased when there is no other evidence than a retention of barium for 24 hours after the cecum has emptied; but retention longer than this shows a definite loss of tone and if present more than 48 hours after, should be considered as indicating disease.

Thirdly, abnormal fixation and obstructing kinks may of course be due to adhesions or bands resulting from localized peritonitis, which originated elsewhere than in the appendix itself, but such cases are rare and the presence of adhesions regardless of their source may often prevent proper drainage of the appendix and cause

digestive disturbances through either direct or reflex influences.

Fourthly, the fact that concretions are present indicates either a loss of normal peristalsis or the presence of an obstruction which has formed while fecal matter was in the lumen and imprisoned the mass which has lost its fluid constituent by absorption and remains as a foreign body loaded with bacteria and awaiting its chance to cause an acute, probably fulminating attack.

Fifthly, the presence of tenderness in the right lower abdominal quadrant may be considered definitely diagnostic only when it is found to follow closely the position of the appendix. It has been observed in about as many of my cases in which the appendix has been removed as in those in which the appendices are under suspicion. When present and definitely attributable to the appendix it signifies not merely a pathological condition, but that there is also an acute or sub-acute inflammation present. Tenderness has been so inconstant in some of my cases from which the most grossly diseased appendices have been removed that I have been forced to give it a position of minor importance in my diagnostic criteria.

When to one or more of the direct evidences there is added further confirmation by the presence of some of the indirect signs mentioned, one is justified in rendering a verdict definitely indicting the appendix.

That the appendix may be so filled or its lumen so obstructed that none of the opaque meal can enter has been too frequently demonstrated to admit of dispute. It is this fact and the additional one that many appendices appearing entirely normal at operation have utterly failed of visualization, that place a definite limitation to the diagnostic possibilities of the roentgenologist.

In conclusion I would emphasize the following points:

(1) There are not a few digestive disturbances in which the roentgen rays reveal abnormal appendices and from which the patient fully recovers after appendectomy.

(2) It is impossible to exclude appendical disease by roentgen ray examination.

(3) Many more appendices may be visualized by employing preliminary preparatory measures, by the use of a suitable opaque meal and observations at shorter intervals than have usually been hitherto reported in routine examinations.

(4) It is often possible by careful roentgen ray examination to point directly to the appendix as the seat of trouble rather than, as has been often done, to indict the appendix by excluding other probable causes of the vague and intangible malady.

DISCUSSION (Abstract)

Dr. Stuart McGuire, Richmond, Va.—In most cases of chronic appendicitis a diagnosis can be made on the clinical history and symptoms alone. In some cases the x-ray furnishes valuable diagnostic help.

A positive diagnosis of appendicitis may be made if the x-ray shows adhesions about the appendix, concretions in the appendix, constant constrictions in the appendix, delayed emptying of the appendix or the presence of tenderness which follows the appendix when it is manually displaced under fluoroscopic examination.

A negative report after an x-ray examination does not exclude chronic appendicitis. If the lumen fails to fill after the administration of a barium meal it may mean the total occlusion of the appendix or it may mean a transient filling and emptying so that at the time of examination it is empty. An empty appendix is of no definite significance. Therefore an x-ray report is valuable in these cases when it is positive, but is unreliable when it is negative.

Dr. Adolph Henriques, New Orleans, La.—We cannot study the appendix without studying the colon as well. The question arises, how is it that some of these appendices fill and some do not, some empty and some do not, some retain the barium residue for one, two, three days or longer and some do not. My own observations would indicate that the appendix fills by a process of antiperistalsis which occurs in the right half of the colon and nowhere else in the digestive tract. When this antiperistalsis is increased there is an increased pressure in the cecum and the food residue will move in the direction of least resistance, which happens to be the appendix and the ileocecal valve. To prove that the appendix fills by antiperistalsis I have seen seven cases where the appendix and cecum were inverted, i. e., upside down. Strange to say, in those seven cases the appendices were filled. If it were purely a question of gravity, certainly the barium is not going to flow up hill. If increased antiperistalsis is maintained, then stasis is produced in the appendix. It cannot empty. If the stasis is not overcome then we have all the factors necessary for the production of inflammation: stasis, bacterial growth, inflammation of the mucosa, and the involvement of the other coats of the appendix. In spite of Rosenow's work in connection with the localization of bacteria, we still have to accept the teaching of the pathologists that in appendicitis the inflammation begins in the mucosa and extends to the other coats. I believe that we can get very much information about the appendix with the x-ray in trained hands.

Dr. W. R. Bethea, Memphis, Tenn.—The condition discussed by Dr. Gray may produce symptoms suggesting anything from mild digestive disturbances to a gastric ulcer with hemorrhages. Such symptoms can be recalled in our cases. There may be symptoms referable to the lumbar spine, slight lameness, etc.

To clear up appendix cases where symptoms are masked a very thorough examination is necessary. In

many cases the barium meal will give information that can not be gained otherwise. This with thorough physical examination will clear up practically all the chronic appendix cases.

Dr. Gray (closing).—I agree with Dr. Henriques in regard to the process of filling the appendix. We have a practical demonstration in the slide I showed where the appendix was drawn like a string. That did not fill by positive peristalsis, but by antiperistalsis. I have made the observation in those cases of inverted cecum referred to by physicians as the appendix up under the liver. Some of you may have noticed my frequent reference to acidosis. At the meeting of this Association in Asheville Dr. McGuire Newton presented to the Section on Pediatrics his observations that the appendix may be the cause of acidosis in children. I rayed several of his cases and most of them were found to have an appendix which was the cause of the acidosis.

EMOTIONAL CONFLICT IN THE CHILD AND ITS FUNCTIONAL AND SYMPTOMATIC RESULTS*†

By BORDEN S. VEEDER, M.D.,
St. Louis, Mo.

The importance of environment and its effect upon the health and development of the child is recognized by every physician. When we think of environment, however, we usually have in mind physical conditions. The role played by overcrowding, poor housing, bad hygiene, improper food and food habits, fatigue, and the like in the development of disease or as a cause of malnutrition in children is what one usually has in mind when speaking of the influence of environment. Perhaps one even goes beyond this in a way as when we think of the "neurotic household" in which a child may live, particularly when a "nervous child" over which the parents have little or no control comes into the examination room. What I propose to discuss briefly in this paper goes beyond this. It is the effect of the environment or surroundings upon the development and control of the fundamental instincts and their associated emotions, which are important factors in the development of the child, and the results of emotional conflict as expressed in functional and symptomatic abnormalities. We are more and more realizing that a knowledge of child psychology is a fundamental requisite for the physician who concerns himself with the welfare and health of children. It is necessary not only for a complete understanding of the child's development and for its management, but because of the effect of psychological abnormalities upon health.

There are a number of instincts associated with emotions which develop early in infancy and which are shared by all. Some of the most important of these are fear, anger, curiosity, self-abasement, self-assertion, jealousy and disgust. They play with others an important part in the development of the child. Through proper environment these various emotions and instincts are made to fit into the life of the child, the undesirable ones held in check and under control and the desirable ones encouraged. If their development is normal and balanced, the child fits into the general social scheme; if their development is unbalanced and emotional conflicts develop, it leads not only to social maladjustment, but, as it is my purpose to try and point out, it may lead to definite functional and symptomatic results which are manifest in the physical side of the child's development.

Owing to time limitation, I have selected to discuss but two conditions: the first, habit spasm, an example of a functional abnormality; and second, malnutrition, an example of a symptomatic condition. By means of case citation I shall attempt to show how emotional conflict may be the important factor in the development or causation of these conditions in some children. Habit spasm is perhaps the most frequent functional disease, if it may be so termed, which the pediatrician encounters. There is one thing in regard to it upon which all agree, that it is one of the most difficult conditions to treat with success. In text books of pediatrics it is considered as a "neurosis" or even as a "form of hysteria" and the importance of a neurotic tendency in the child is emphasized by all. So far as direct etiology is considered, the discussion is usually vague and indefinite. Many authors refer to a "local irritation" as the exciting cause, although, as Still admits in his excellent clinical discussion of habit spasm, this is found in only a small number of cases. He suggests that a local irritation at one point may bring out the muscular contraction or spasm in another.

Some explanation of this kind is necessary if the "local irritation" theory is valid, for one must account for the marked tendency which we all have observed for the form of spasm suddenly to change. Thus a child who has been blinking suddenly stops and starts nodding the head, or a child will alternate periods of clear-

*From the Department of Pediatrics, Washington University School of Medicine, St. Louis, Mo.

†Read in Section on Pediatrics, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

ing the throat with shrugging of the shoulders. There are certain other things frequently noted with habit spasm which give us a closer insight into the etiology. Frequently one notes that a change of scene or surroundings improves the condition or that the habit spasm may be quite manifest in one place and scarcely noticeable at another. Thus children with a marked habit spasm at home are often free of it at school and vice versa. I have seen a marked habit spasm in a child disappear when he was admitted to a hospital to recur when he had been discharged and returned home. In other words, environment plays an important part. It is, I believe, an emotional conflict produced by some factor in the child's environment which brings about the condition of habit spasm.

A boy of four years developed a marked form of habit spasm in which he would gasp deeply, hold his breath, and then give a long drawn out sighing expiration. He had been extremely ill with pneumonia the previous winter and the parents were certain that the spasm was in some way related to the previous pulmonary condition. In going into his history from the standpoint of his emotions, I found that he had a tremendous fear of another boy, somewhat older, who lived in the same block, and who constantly teased him and threatened to "lick" him. The younger lad was afraid to go on the street alone, and was even frightened when his nurse was with him if they met the other boy. I suggested that fear was the cause of the habit spasm and advised sending him up-state to a summer home for a few weeks. The spasm stopped almost immediately, to recur on his return. He was then sent south for several months with grandparents, who reported that the spasm had entirely disappeared after a few days. Three months later he returned and almost his first remark was: "I hope D— lets me alone," and by night the spasm had recurred.

Another child, a girl of ten, developed a habit spasm one fall, which was marked at school but much less evident at home. On going into the matter we found she was being tormented by a group of children at school. On changing schools, perhaps poor therapy from the standpoint of not forcing emotional adjustment, the spasm at once stopped.

A number of cases in which "fear" played an etiological role might be cited. Before leaving the subject of habit spasm, let me cite a case in which the emotional conflict was one of inferiority or self-abasement.

A lad of six years developed a most annoying habit spasm of sniffing, alternating with periods of clearing the throat and occasionally by spells of choking. His father insisted there must be something the matter with his nose and throat and carted him around to nose and throat specialists who treated him, although they did not find much to treat, without results, quite as might be expected. After delving into the situation for some time the following came to light. This lad and his eight-year-old brother had been constant companions and had practically no play or mixing with other children. All their lessons had been together at home with governesses. The fall before the spasm started the older brother had been sent to school where we found he had been rather a "mark" for the other children, owing to his inability to mix naturally with them. To make up for his own inferiority at school he had found his outlet in taking it out on the younger brother and was constantly passing his own experiences along. The feeling of inferiority of the younger boy found its expression in the habit spasm. It was advised that the younger boy be sent for a time to an aunt who lived some distance away where he had other children to play with. At once the habit spasm improved. After a month he returned home and soon it was again almost constant. Removal a second time was followed by improvement to recur again on return home. So the cycle continued until a still younger lad moved in next to his own home. The patient then adopted him as a companion and was enough older to be the boss and leader. Soon the habit spasm almost completely disappeared.

If time were available I could cite a number of cases of habit spasm which have come under my observation in which it has been possible to work out an emotional conflict which I believe has been the underlying cause, although it has not always been possible to work out a solution and prove the condition, in so far as it may be proved. In other cases, however, it has been impossible to work out the basis of the underlying conflict, a failure, I believe, the result of inability to get deep into the family life or the life of the child.

Turning now to a symptomatic condition such as malnutrition, the situation is more involved. In the vast majority of children with malnutrition, it is possible to work out a definite etiology. It may be due to physical causes, as acute or chronic infections, cardiac disease, physical defects requiring correction or to environmental conditions. Among the environmental conditions the most important are bad hygiene, improper diet and food habits, fatigue and the like. In every case of malnutrition these are the factors which should be gone into first and usually the therapeutic indication will be found in one or more of them. At times, however, we become involved in cases in which the etiological factor is vague and we cannot link the condition up with any of the usual causes nor does the usual management bring about the customary results. These children are usually free of physical defects and the routine environmental treatment of diet, rest in bed, even for prolonged periods, does not accomplish much and it is necessary to go deeper into the psychological reactions of the child. We usually say that these children are "nervous," "high-strung," etc., and summing the situation up in this way let it go.

A girl of about ten years had been under my care for some time with little or no improvement. She had been put on diets, forced feedings, kept home from school, put on rest at school, put on rest cure for weeks at home, etc., with a slight temporary gain at times but never a permanent one. After many months in a casual way, I learned that she had a fear of fire for a number of years. On going into this clue deeper it was brought out that this was still a constant fear and that the child never wanted to go to bed or sleep for fear the house would catch fire. The condition was attacked from this angle and after changing rooms and after some weeks of convincing the child that she was in no danger, the condition for the first time showed permanent improvement.

A boy of eleven who had been under my charge for some years began to go to pieces and his weight went down and his school work deteriorated rapidly. It was finally worked out that he had become exceedingly jealous of a younger brother who had not been well, and for this reason had become quite the center of the mother's solicitude. The younger brother because of his illness was allowed to do about as he pleased, while the older boy had more or less to toe the mark. The family's attitude to the older boy was changed and his mother took him away for a short trip with her, leaving the younger boy at home. His weight, general physical condition, and attitude improved at once as soon as he found that the younger brother was no longer the "favored child" of the household.

Another interesting case of malnutrition in a boy of eight was worked out on the line of self-abasement or an inferiority complex. Previous to this time he had been put on a rest cure, diets, tonics, and the like by two or three physicians without improvement. At home he was irritable, querulous, bossy and continually nagging at his younger sisters. I found that at school that the situation was different. Here he was, as one youngster expressed it, a "poor fish." He was constantly getting into trouble at the playground and was then afraid to fight or stand up for his end. He was being constantly teased and plagued by the other children. It was decided to treat the malnutrition from this standpoint. The boy's interest was aroused in developing his muscles and learning to handle himself physically. He was impressed with the idea that if he followed out our plan he would soon be able to stand up for himself and could "beat up" the other boys who were tormenting him. Working along this line with a changed mental attitude towards his situation, he put on some twelve pounds in a few weeks. Instead of rest, he was given exercise and took quantities of food without difficulty as he was made to understand that unless he put on weight he could not develop his muscles.

These three cases illustrate sufficiently, I think, the point I am trying to make, that some emotional conflict may be the underlying basis of malnutrition, and unless the child is worked with from this angle you will not, and cannot, expect to get results.

Other conditions, such as persistent enuresis, some type of vomiting, speech defects, etc., might be cited where there is frequently a background of emotional conflict and other emotional conflicts besides these mentioned above could be cited as the background of functional or symptomatic conditions. I do not wish to be misunderstood as implying that these conditions are always due to emotional conflicts, for, as I stated above, malnutrition is usually due to some other cause. My purpose is chiefly to emphasize the importance of child psychology in the routine practice of pediatrics, not simply in the management of children, but as an important factor in the etiology of certain abnormal conditions.

How do the emotional conflicts bring about these physical reactions? What is their mechanism? The answer, I think, is found in the study of behavioristic psychology in which the reactions of the individual are considered as the response to stimuli, using these terms in a physiological sense. Psychology in this sense is the study of environmental adjustment. Ordinarily the emotional instincts are controlled and brought into adjustment with the child's life and environment. At times through excessive stimulation, perhaps, or failure of control of some emotion, the instinct or emotion assumes a dominating role and in the attempt to adjust it to the child's life or environment a conflict ensues.

Perhaps in the case of habit spasm the outlet of the conflict takes place through the muscular mechanism leading to the spasmodic contraction of some group of muscles which recurs and the "habit spasm" develops. When the source of the stimulus of the emotion is gone there is no conflict and no outlet is required and the spasm automatically ceases. In the case of the more general and less specific reactions as malnutrition we can assume that the reaction is more general and involves the entire organism. It seems hardly necessary to remind you that normal emotions, such as fear, anger, and the like, which are induced by outside stimulation, express themselves through the neuromuscular mechanism. Thus, fainting, increase in heart rate, congestion, shrinking, nausea and many other physical phenomena are common reactions to emotions. Whatever the mechanism may be there is one thing we can be sure of and that is the practical importance of child psychology in the field of pediatrics.

DISCUSSION (Abstract)

Dr. W. L. Funkhouser, Atlanta, Ga.—Following in the footsteps of such men as the late Dr. Sedgwick, we have reduced, in a large measure, our nutritional diseases, and by various preventive measures have reduced the number of diseased conditions. So, if we were at all pessimistic, we would feel that the job of the pediatrician would soon be at an end. However,

there has been development in other branches of medicine.

As Dr. Minor said yesterday, tuberculosis is essentially a disease of childhood, and it is our duty to see that the child approaches adult life free from tuberculosis. The heart specialist tells us that children should approach adult life free from cardiac affections, which is accomplished mainly by the removal of foci of infection. A number of cities have clinics which take care of a few of our problem cases, but we are going to have to study normal and abnormal child psychology in order that we may treat our cases properly in childhood. Where we have a neurotic mother of a neurotic child we have a problem.

Dr. Veeder has shown us that, in addition to the study of disease we shall have to consider the study of health, mental and physical, and how to promote it.

Dr. I. A. Abt, Chicago, Ill.—This question of emotion and neuropathic states in childhood is of the greatest importance, not only so far as the mental life of the child is concerned, but also from the child's nutritional standpoint. Nervous children refuse food or show perversion of appetite, are anemic and fail to gain in weight and strength.

One might go a step further than the essayist did in his paper. Before environment comes heredity. Many of these children are of neuropathic origin. They come into the world with a neuropathic or a psychopathic constitution which sometimes shows itself while the baby is still in the cradle. It has been pointed out that the three dominant emotions of the young child are love, fear and rage. The love which the parent bears his child is the most natural human instinct. The love that the child returns to the parent is also natural and desirable. But, on the other hand, this question of love between parents and children may be very much exaggerated and overdone, as sometimes it is neglected.

In a neuropathic child, the emotion of love is so intense, so warm, and so excessive that his craving for love and adoration is insatiable. Similarly, the mother loves much, but not wisely. She is demonstrative, overstimulating and profuse in her affections. This is most evident in the case of the only child. He is led to believe that he is the most brilliant and perhaps the only star in all the firmament. He is surfeited with love. He becomes selfish. It is evident that the training and environment are at fault..

In dealing with children one should be moderate and undemonstrative in bestowing love and affection. It is better to treat the child in a matter of fact way, to teach him to take things as they are, to avoid exaggeration in word and deed, to meet occasions calmly and quietly and with fortitude. The child should be treated with a certain degree of disregard and unconcern. He should be sent to the play ground, to indulge in sports and games. If he receives a wound or an injury or is conquered in fistic combat he should be encouraged to bear his defeat or injury courageously or with stoicism. Just as muscles may be strengthened by exercise, so nerves and nerve centers may be trained to endure pain and to bear the hardships which come from defeat and disappointment. It is evident that training is of great importance in avoiding and curing nervousness. Some of these children, as Dr. Veeder says, should be removed from their home environment. They should come under the care of competent teachers and well trained medical men. Physicians and psychiatrists should be consulted for the proper management and education of the mild as well as the severe cases. We who see these cases so frequently should be prepared to apply the most intelligent and advanced methods for the relief and proper training of the abnormal behavior of neuropathic and psychopathic children. We should tell the parents how to train and manage their children sensibly, which is, after all, one of the most important functions of the practitioner of pediatrics.

Dr. Tom A. Williams, Washington, D. C.—The National Committee on Mental Hygiene has been publishing a list of books which they consider useful for those who are concerned in training the mental habits of the child. The sexual element has been exaggerated too much by so-called psychoanalysts, and so many men have discarded all psychotherapy. The difficulty a child presents to his parents is emotional. It is quite possible, however, to treat the emotion. All emotion is derived, induced, conditioned by some factor, which is a mental one, an apperceptive one. It is the child's knowledge that determines his emotions. Why is one child afraid of a situation that does not frighten others? Because he has a different idea of it. If other children had the same idea they, too, would be afraid. One has to deal with a child's emotions by changing his ideas. Pediatricians, to be useful to children, must get a very clear idea of the psychological mechanism of children.

Dr. John A. Foote, Washington, D. C.—For a long time nervous children have been going to the school teacher, and the school teacher has been drilled in psychology with the idea of correcting some of the mistakes that were made earlier. When pediatrics became generally taught the pediatrist soon found that here, too, was a problem for him, a problem that medicine would not cure.

Dr. William A. White, of Washington, has said that the mental pattern of the child's life is formed in the first five years. We cannot depend on the school or the church to train the child. We have to depend upon the parents. Parents must be taught how to handle their children from a psychological standpoint. Who is going to teach them? The physician must, to a certain extent. The pediatrist is face to face with this problem. It is his responsibility to advise and to "bring up" the parents.

Dr. Veeder (closing).—Pediatrics is a broad subject, which draws from all fields of medicine. It was the purpose of my paper to show that the study of the psychology of childhood is not simply of theoretical value but is of specific and practical importance.

DETERMINATION OF POSSIBLE PSYCHOTIC TRENDS IN ADOLESCENCE BY A MODIFIED CIRCULATORY RATING TEST*

By PHILIP J. TRENTZSCH, M.D.,
Washington, D. C.

In the present stage of evolution of mental hygiene we are confronted by the lack of objective diagnostic findings which may be relied upon as the prodromal signs or symptoms of a psychosis, before the patient becomes definitely psychotic. Realizing that by far the great majority of the mental hygiene problems have their beginnings in adolescence, it occurred to me, after applying the Schneider index test, a circulatory test, to known psychotic cases, that it might be useful in solving this problem. After making the necessary revisions of this test I applied it to a group of adolescent children.

At the beginning of this study it would be well to give a brief resume of former applications of this test. During the World War a rating system was worked out by Schneider[1] by which the physical efficiency of the men in the air service was measured. The Army was having difficulties, in as much as some of the aviators gradually succumbed to physical and mental deterioration. They became less reliable in handling aeroplanes, which eventually led to crashes. For fear of being called "yellow" the aviator hesitated to tell when he did not feel in condition to fly, so it became necessary to develop some means by which his condition could be determined. Out of a group of 54 cases Schneider found only six which had a score of ten points or over; while the rest obtained a score ranging between nine and ten, showing 88.8 per cent having a low score.

The neurologist and internist worked independently without the data from the cardiovascular rating board, and found abnormal conditions in thirty out of the forty-six cases. Thus when working independently, 65.2 per cent of the group of forty-six with the low scores by the cardiovascular efficiency test were found by others to be below standard.

I applied this[2] test on a group of 124 psychotic patients who had been under observation in the hospital over a long period of time and whose diagnoses were made on their mental symptoms. They all presented a definitely diseased process of long standing. In the hebephrenic dementia praecox and the catatonic dementia praecox groups only 12.8 per cent and 26.6 per cent respectively had a high rating. Combining the two groups I found that 82.61 per cent of the cases, with the epileptic individuals, showed a low rating.

Previous to this Lewis[3] presented a group of 601 necropsies in cases of hebephrenic and catatonic dementia praecox patients, and found that 71.55 per cent had small aplastic hearts; also that they had incomplete development of the capillary system. In a comparative table presenting heart weights in the psychosis, he showed that 75.5 per cent of the dementia praecox hearts (hebephrenic and catatonic), weighed below normal, while only 8.7 per cent of the paranoids weighed below normal. In the manic depressive and the epileptic groups, 30.2 per cent weighed less than the average. These observations show a striking contrast between weight of the heart in the catatonic and hebephrenic types of dementia praecox and other forms of psychoses, particularly those of the paranoid and maniac-depressive groups.

Wherefore from these findings it appears that certain types of psychosis have a small circulatory system and thus we may be justified in considering this an objective finding which is more or less reliable.

Many authorities speak of the extraneural pathology of nervous disease. At the age of 20, the majority of people have reached the limit of their development. They have not the organic background to go further. One can readily conceive why they should break down and yet find no reason for it in the brain. It is impossible for the nervous system to integrate anything that is not there. We must always keep in mind the consideration of the individual as an organism of the whole.

Permission was granted to carry out the test on a group of 100 adolescent children between the ages of 10 and 15 years, in the public schools of the District of Columbia. This group had previously been tested by a psychologist, who had divided the entire 7-B grade into three classes: the advanced, middle and lower classes, according to their psychological ratings. The children had also been observed in their class work from a practical standpoint and if their school work was of an advanced nature they were immediately placed in the higher classes.

As the adolescent age is the period when one

*Read in Section on Mental and Nervous Diseases, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

can start molding the individual personality and can begin to overcome any physical defects of the circulatory system, it is very important to recognize subnormal conditions at this time.

The first step necessary in making this test was to find a standard pulse rate for children between 10 and 15 years of age, which would be acceptable to the general practitioner.

I found in going through the literature on the subject that Melvin and Murray[5] state, on the ground "of results obtained from investigation made on forty children" whose ages ranged between 4 and 14 years, that they found the average systolic pressure was 108.1 millimeters and the average diastolic pressure was 72.4 millimeters; the average pulse rate being according to this 93.6. Comby, Jules,[6] stated that the pulse rate in children 12 years of age ranges between 80 and 90 beats per minute.

Griffith and J. P. Crozer[7] found that the pulse rate in children between the ages of 10 and 14 years averages 80 and 90 beats per minute, while Monte[8] found that the pulse rate varied between 80 and 90 beats per minute in children between the ages of 10 and 15 years. Taylor and Wells[9] found the average pulse rate in children between the ages of 7 and 14 years 80 and 90 beats per minute and Thompson found the range between 85 and 75 beats per minute between the ages of 7 and 14 years.

Cohen[10] found the pulse rate to average 89 beats per minute in children ranging between the ages of 9 and 12 years, while McCurdy,[10] in a study of 28 children ranging between 10 years and 14 years and 9 months, in which he took in consideration both the reclining and standing pulses, found the average pulse rate in the reclining child to be approximately 80 beats per minute and in the standing child approximately 85 beats per minute. Holt[12] states that the average pulse rate in children between the ages of 11 and 14 years is between 75 and 85 beats per minute.

The average pulse for the group of 40 girls and 60 boys ranging in age between 10 and 15 years was 90.84 beats per minute for the reclining child and in the standing child 97.73 beats per minute. In taking an average of these findings we have a pulse rate of 85 beats per minute for the reclining child whose age is from 10 to 15 years and 87 beats per minute for the standing child whose age is between 10 and 15 years.

With these averages I placed my first rating for reclining pulse between 70 and 90 beats and the figure for standing pulse between 80 and 90 beats per minute. The original tests made for normal adults commenced their rating at 50 to 60 beats per minute for the reclining pulse and for the standing pulse at 60 to 70 beats per minute. After revising the index the findings obtained on the children were tabulated, with the following results which are shown in chart number one.

CHART NO. I

No. Tested—100.
No. Rating 10 or Above—85.
No. Rating Below 10—15.
No. of Girls Rating Below 10—10.
No. of Boys Rating Below 10—5.

The first interesting feature is that the greatest number of low ratings was in the upper and lower classes respectively, whereas the more stable middle class showed only a few having a poor circulatory system. The second interesting feature is the fact that it was possible to pick a number of these pupils irrespective of their high mental age and I. Q.'s, whose practical class work was in such poor condition that the teachers were compelled to place them in the lower classes regardless of the psychological tests and these results. (Cf. Chart No. II.)

The list of the fifteen children who secured a low rating in the test was presented to the principal of the school and after looking it over she stated the school had been having considerable trouble with several of the pupils listed. She then called on the various teachers who came in contact with each child. They stated that practically all of the children grading low by the test had been getting along less well than they should, but that they were unable to analyze the difficulties. Considerable data was obtained from the teachers concerning each pupil on the list, and I also made a personality study on each child according to Fernald's[11] outline used by him in the Massachusetts schools. The following histories are more or less typical of the entire group.

Case I.—L. S. is a 12 year old boy, an only child of divorced parents and lives with his mother, who seems indifferent to the boy's problems when she is approached by his teachers. He is tall and well developed for his age. The boy is extremely careful concerning his personal appearance, always appearing neat and clean, with his hair carefully brushed, his clothes well pressed, and it was noticed at school the boy avoided all labor that would soil his hands, always keeping his nails highly polished and his hands soft and effeminate looking. When he was questioned concerning his future, he discussed his ambitions freely and said he hoped to be either a doctor or a lawyer, as he did not care to do labor or any hard work which required him to soil his hands. The teachers complained of the boy's being very troublesome, as he continually

CHART NO. II

Class A Group

Name	Circulatory Rating	Chronological Age	Mental Age	I. Q.
S. F.	5	12 yrs.	12 yrs. 8 m.	104
M. S.	4	12 yrs.	16 yrs. 4 m.	115
H. F.	3	11 yrs.	16 yrs. 7 m.	122
M. B.	7	11 yrs.	16 yrs. 1 m.	117

Class B Group

M. B.	3	12 yrs.	13 yrs. 9 m.	104
R. M.	6	14 yrs.	15 yrs.	102
M. C.	1	14 yrs.	12 yrs. 1 m.	97
B. D.	9	14 yrs.	13 yrs. 7 m.	96

Class C Group

J. S.	5	15 yrs.	12 yrs.	92
E. K.	6	15 yrs.	10 yrs. 11 m.	83
S. L.	6	13 yrs.	10 yrs. 6 m.	88
J. W.	9	15 yrs.	13 yrs. 8 m.	95
L. S.	9	12 yrs.	16 yrs. 7 m.	115
S. S.	6	14 yrs.	9 yrs. 9 m.	86
J. G.	8	14 yrs.	10 yrs. 9 m.	90

Summary

Group	No. of Pupils	Per Cent Rated at 10 Points or Below
Class A	26	15.3
Class B	45	8.9
Class C	29	24.4

annoyed both them and the pupils and did not attend to his lessons. When corrected he became sullen and suspicious, always blaming some one else for his troubles. He told them that they disliked him or were jealous of him because he was so intelligent that he did not have to study or take his books home at nights. He tried to attract attention to himself and to be the center of the stage at all times; annoyed people he came in contact with, causing trouble whenever he was present; created scenes by showing a violent temper or assumed a sullen and depressed attitude. He chose bright red flowers for his lapel, assumed an extremely sophisticated air, and appeared very sure of himself at all times. A complaint had been recently handed in to the principal of the school by a boy friend of L. S. that he (L. S.'s friend) had been annoyed by a strange man who approached him outside the school grounds and wanted him to go for a ride in the park. The stranger insisted, telling the boy he wanted him to sell some things during the summer months and also promising the boy "a better time than he could have with the girls," and stating as an inducement that L. S. went out with him frequently. L. S. was questioned concerning the story, but was very evasive and immediately turned the subject of conversation. Now while this boy had a mental age of 16.7 years and an I. Q. of 115 he was unable to do the work required in either the advanced or the middle classes but was placed in the lower grade, where it was apparent he made a much better adjustment. Among the pupils in the lower grades the competition was not so keen and his mental test was the highest in the class. He was admired and looked upon as much superior to the rest of the pupils. His egotistical cravings were more or less satisfied in this environment and he was nearer being the "ideal man" he wished to be. He graded 9 in the circulatory rating.

Case II.—N. F. was an attractive 11 year old child of educated parents. She was a little under weight, had a slight speech defect and was extremely nervous, being unable to sit or stand still, always restless and continually jerking from side to side. Spent considerable time writing poetry and had produced a number of poems woven around her girl friends and the birds and flowers. She enjoyed playing with her dolls and while at home spent most of her time in that way. At school she got along very well, but had to work hard to keep up with her studies. It seemed difficult for the child to concentrate on her work, but she never caused any trouble, made few friends and was very quiet and unassuming. The teachers were afraid she was being pushed a little too much, but with her mental age of 16.7 years and an I. Q. of 122 they had nothing definite to place their suspicions upon and she was left in the advanced class.

A short time previously the father called at my office and I learned that there were family difficulties which were causing trouble between the father, mother and grandmother, who was an invalid and made her home with her son. The child was a great favorite with her father and during the family troubles she received the brunt of the quarrels trying to take sides with the father, but also trying to protect her mother from the grandmother, whom the child disliked, and, at times, was very disrespectful to. When the child played with other children she became very nervous and excited, talked incessantly and was so nervous she was unable to eat her meals. The teachers had no definite knowledge of this emotional strain in the girl's home life and were somewhat skeptical when this pupil's name appeared on the list. She never had caused them any trouble, but had always appeared to them a perfectly normal pupil in every way. She rated 3 in the circulatory test.

Case III.—J. G., a 14 year old Jewish boy, who was overdeveloped physically, graded 10.9 years on his psychological test, with an I. Q. of 90. The boy had a sneaky disposition, lacked ambition, was untidy about his person, had no interest in sports of any kind, but was content to sit around alone most of the time. The teachers stated that he sat quietly at his books for lengthy periods but was absolutely unable to grasp any of his studies and seemed to be dreaming away his time. During the personality examination it was extremely difficult to direct his attention. He told me many fantastic stories, tales woven around himself, stories of daring deeds accomplished by him, making him a great hero; more or less a true picture of the introverted type of personality. This youth graded 8 in the circulatory test.

Case IV.—M. B. was a small, thin, underdeveloped girl 12 years of age. She was extremely active, always busy either at her school work, with athletics and dramatics, or with the various other organizations of the school, always as the leader of the movement. She signed her name "Organizing Mary." She was an adopted child, having spent considerable time in various orphanages and having been twice adopted, the last time by people who seemed very fond of her and wanted the child to have every advantage, but who were very strict and refused many of her requests. This was brought to the principal's attention when the mother refused the child permission to wear bloomers during the physical culture period, stating that she considered it unladylike. Mary greatly resented this and immediately began to scheme to wear her bloomers without the mother's knowledge. It was found later that she was borrowing books to read which had also been prohibited by her mother. She tried hard to dominate the teachers, and when scolded by them she became sullen and resentful. She was very suspicious, high strung and quick to note any changes even in the tone of the voice. She was constantly on the defensive and absolutely lacking in a sense of humor. She had

a mental age of 13.9 years and an I. Q. of 104, but graded 3 in the circulatory rating.

Case V.—R. M. was a tall, unattractive 14 year old girl of an American mother and a Chinese father. She was large boned, had prominent features and was rather awkward. She seemed fond of athletics, although she did not mix with other children as a rule, keeping more to herself and her school work. She was a good worker and studied hard to keep up with the middle class. The teachers placed entire confidence in her and numerous duties of trust were given to her. A 12 year old sister, who was almost an opposite type, went to the same school, but was in an advanced class. The sister was a dark, slender, almond-eyed girl, very quiet and unassuming, getting along nicely in her school work with apparently little effort. Considerable jealousy of the sister was noticed in R. M. during the personality study. She gave a lengthy discourse on her sister's faults, speaking of the sister frequently as a "cry baby." The girl was very anxious to find out all about the rating test upon learning that the sister graded 11 while she graded 6. She also brought in the father's name, frequently ridiculing him for various affairs, and showed considerable emotion when her Chinese ancestry was mentioned, insisting that she was an American. On a number of occasions difficulties occurred at the school, and it was reported to the teachers that at these times R. M. "simply went to pieces," either becoming violently angry or crying and going into hysterics. She graded 6 in the circulatory test.

PROCEDURE IN MAKING TESTS

(1) The patient reclines for five minutes. (a) The heart rate is then counted for 15 seconds. When three consecutive 15 second counts are the same, this is multiplied by 4 and recorded. The score is noted according to Part A, Table I. (b) The systolic blood pressure is next taken by auscultation. Two or three readings are made as a check.

(2) (a) The patient stands at ease for one or two minutes to allow the pulse to assume a uniform rate. When three consecutive 15 second counts are the same, this is multiplied by 4 and recorded. The score is obtained by use of Part C, Table I. The difference between the standing and reclining pulse rates is scored by use of Part B, Table I. (b) The standing systolic pressure is next taken. The difference between this and the reclining pressure is then scored by Part F, Table I.

(3) The patient next steps on a chair about 18 inches high, five times in fifteen seconds timed by a watch. To make this test uniform, he stands with one foot on the chair at the count of one; this foot remains on the chair and is not brought to the floor again until after the count five. At each count he brings up other foot on the chair, and at the count "down" replaces it on the floor. This should be timed accurately, so that at the fifteen second mark both feet are on the floor. (a) Immediately, while he stands at ease, the pulse rate is counted for fifteen seconds; this is multiplied by 4 and recorded. (b) Counting is continued in fifteen second intervals for two minutes, records being made of the counts at 60, 90 and 120 seconds.

The data from (a) will be scored by Part D, Table I, taking the difference between this exercise pulse rate and the standing rate. The data in (b) are scored according to Part E, Table I.

TABLE I.—CARDIOVASCULAR EFFICIENCY TEST
TABLES OF POINTS FOR GRADING

A—Reclining Pulse Rate in Children Age 10-14 Years.

(a)	70- 80—3 pts.
(b)	81- 90—2 pts.
(c)	91-100—2 pts.
(d)	101-110—1 pts.
(e)	111-120—1 pts.
(f)	121-130—0 pts.

B—Pulse Rate Increase on Standing.

0-10 Beats, Points	11-18 Beats, Points	19-26 Beats, Points	27-34 Beats, Points	35-42 Beats, Points
3	3	2	1	0
3	2	1	0	1
2	3	2	1	2
2	1	1	2	3
1	0	2	3	3
0	1	3	3	3

C—Standing Pulse Rate in Children Age 10-14 Years.

(a)	80- 90—3 pts.
(b)	91-100—2 pts.
(c)	101-110—2 pts.
(d)	111-120—1 pts.
(e)	121-130—1 pts.
(f)	131-140—0 pts.
(g)	141-150—0 pts.
(h)	151-160—1 pts.

D—Pulse Rate Increase Immediately After Exercise.

0-10 Beats, Points	11-20 Beats, Points	21-30 Beats, Points	31-40 Beats, Points	41-50 Beats, Points
3	3	2	1	0
3	2	1	0	0
3	2	1	0	1
2	1	0	1	2
1	0	1	2	3
1	1	2	3	3
0	2	3	3	3
0	3	3	3	3

E—Return of Pulse Rate to Standing Normal after Exercise.

Seconds	Points
30- 60	3
61- 90	2
91-120	1
After 120: 2-10 beats above normal	0
After 120: 11-30 beats above normal	1

F—Systolic Pressure, Standing, Compared with Reclining.

Change in Mm.	Points
Rise or 8 or more	3
Rise or 2-7	2
No rise	1
Fall of 2-6	0
Fall of 6 or more	1

SUMMARY

(1) A cardiovascular rating test was worked out on a large group of aviators and it was found

to be a satisfactory method of eliminating unstable fliers. All of the unstable cases showed a low rating by the test.

(2) This test was tried on a group of known psychotic cases in which the diagnosis was more or less certain. The data obtained indicated that certain types of mental disease showed a low rating.

(3) In a group of 601 necropsies at St. Elizabeth's Hospital certain types of mental disease showed small aplastic hearts and also an incomplete development of the capillary system. Also, in a comparative table showing heart weights the hearts of these cases weighed below average.

(4) With these facts the test was revised and applied to 100 adolescent school children all in the same grade. All had been rated by a psychological test and placed in the advanced, middle and retarded classes in 7-B grade.

(5) Out of 100 children tested, 85 rated 10 points or above, while 15 rated below 10 points.

(6) Out of the 100 children rated by my revised circulatory test twenty-six pupils were in the advanced class; four of these rated below 10 points, or an average of 15.3 per cent. Forty-six pupils were in the middle class. Four of these rated below 10 points, or an average of 8.9 per cent. While twenty-nine pupils were in the retarded class seven of these rated below 10 points, making an average in this group of 24.4 per cent, thus showing that the more or less stable middle group had the smallest average of pupils rating below 10 points.

(7) When this list of fifteen pupils who had a low rating was presented to the principal of the school it was learned that all of these pupils presented some problems to the teachers, and the histories obtained from the teachers and the children showed many neurotic symptoms.

CONCLUSION

It would seem from the facts presented above that there is a type of mental disease which is extra-neural and that the pathology is in the circulatory system; that the diagnostic test worked out on a group of known cases corresponds with the autopsy findings in the same type of case. Consequently the revised test for children should be a reliable indication of early psychotic tendencies in children and aid us in the prevention of at least some cases of mental disease.

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DISCUSSION (Abstract)

Dr. William Nelson, St. Louis, Mo.—In handling children of the adolescent and pre-adolescent age I have been struck very forcibly by the correlation that exists between physical disease and certain emotional and mental abnormalities. I do not believe that we can draw definite conclusions as to the importance of circulatory conditions as an etiological factor. We can recognize the correlation between the physical and mental defect.

The brief histories often show us individuals of a high intelligence. When we consider that the autonomic nervous system is under the control of the informatory nervous system of our body, and when we consider that the heart and blood vessels are part of that system, that in emotional instability we have an overaction of the autonomic nervous system, we can easily conceive the existence of definite circulatory changes as part of our emotional aberration. But we have not sufficient data to draw definite conclusions.

Dr. W. J. Otis, New Orleans, La.—In the majority of these cases we are dealing with a certain type of inferiors. The histories and other social data will as a rule aid us. These inferiorities are either constitutional or intellectual, and are much marked.

I should like to ask if neuro-circulatory asthenia was ever considered in conjunction with any of these cases.

Dr. R. M. Van Wart, New Orleans, La.—The chief value of this paper is that it calls attention to the relation of the brain and the nervous system as a whole, to other parts of the body. There are two factors to be considered: first, what is the type of the nervous system and, second, the interrelationship between the nervous system and the physical makeup of the individual. Unless we have some clear idea as to how far the nervous system is involved in causing this reaction, it would be unsafe to draw conclusions. In a condition such as nephritis in a child, we are not

confronted so much with the question of nephritis, as with that of nephritis in the particular type of person affected. I have seen a number of notes on the circulatory system in which the radiograph was smaller than was expected and at the same time in many instances no type that one could put down as neurologic.

It is necessary to take into consideration the reaction of the individual as a whole and not one particular factor in his makeup.

Dr. Lydia Poage, Cincinnati, Ohio.—As we are greatly at sea on the pathology of mental conditions we should not hesitate to seize upon anything that will help us out. If we can prevent some of them, let us use whatever we find that will help.

Dr. Beverley R. Tucker, Richmond, Va.—The same question presents itself as to whether mental disease is psychogenic or physical in its basis. Although we cannot prove that some states have a physical basis, that does not necessarily mean that there is not an underlying physical basis. Any test, any investigation, any thought along this line is potentially productive of a better understanding of mental disease. Some years ago I made a bold statement that there was no such thing as a purely psychgenic condition. The older I grow the fewer bold statements I want to make. I am not qualified now to say whether this is true or not. Possibly the psychotic state may of itself, upset the physical state. Possibly the physical state in other instances may upset the mental apparatus. However, these things may be, we cannot come to any definite conclusion at the present time but must continue investigations. Therefore, I think Dr. Trentzsch's paper is exceedingly valuable in that it is one form of investigation which without a great deal of difficulty can be discredited or substantiated.

Dr. Trentzsch (closing).—The psychic factor is not eliminated entirely in these tests, but the children are examined in groups of two or three which makes it more congenial. After the first group has left and told the others all the details there is very little psychic factor left and it becomes instead a way of getting out of lessons.

The cases read presented the most outstanding problems. All the cases presented some neurotic characteristics. I was unable to do any endocrinology tests on these children, but such tests were worked out on a former group of patients.

In problem cases, this test has broader selective possibilities. Out of 100 children only 15 per cent of cases which the test selected were problem children. It is hoped that this test will indicate cases that might eventually become psychotic. Regarding the question concerning neuro-circulatory asthenia. I did not try to differentiate these cases but included them in the general group. These children were all strangers to me and my test selected 15 out of the group, all of whom showed some neurotic tendencies. By this test I hope to get some diagnostic symptoms in children, something tangible, something by which we can make early diagnosis and by applying mental hygiene, eliminate at least some cases of mental disease.

BLOOD TRANSFUSION IN MALNUTRITION IN INFANCY: STUDY OF FIFTY CASES*

By ALDERT SMEDES ROOT, M.D.,
Raleigh, N. C.

During the past eight years articles upon blood transfusion in states of malnutrition in infancy have appeared in medical literature. Fischer,[1] Kerley,[2] Lowenburg,[3] Robertson Brown and Simpson,[4] Burk and Fischer,[5] have reported series of such cases. While these and other papers have helped to focus attention upon the value of blood transfusions in this type of case, it is undeniably true that there is not the wide recognition or practice of this therapy which the results justify. It is true that in hospitals connected with the larger institutions of teaching the value of blood transfusions is fully appreciated and they are routinely performed when indicated, but in the smaller cities it is seldom that this obtains. In the latter case the pediatrician will be the only one who can properly determine the indications for it, consequently he should be prepared to perform this relatively simple operation.

The types of cases of malnutrition for which blood transfusion is particularly indicated are (1) those babies who, either in the course of or following diarrhea, have reached a stage of anhydremia from loss of fluid from the tissues and (2) cases of athrepsia, and (3) those infants, who, through some parenteral infection, are conspicuously underweight and anemic and who do not respond to the institution of a rational diet for their respective weights. Under the first head, acute diarrhea with co-incident rapid loss of weight, fever, often a complicating acidosis due to failure of the kidneys to excrete acid phosphate, and protein concentration of the blood serum are features which characterize the illness. Under the second head, athrepsia, are those infants who are in state of starvation, due to an abnormal condition of the gastro-intestinal tract as a result of which food administered is not absorbed. Marriott[6] described with great clarity some phases of the pathology of these two conditions in his Harvey Lectures, 1920-1921. Under the third head, parenteral infections, may be: chronic purulent otitis, mastoiditis, empyema, extensive local skin in-

*Read in Section on Pediatrics, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

fections such as furunculosis or impetigo, or a constitutional disease such as a long standing pyelitis, typhoid fever, and occasionally malaria.

In 49 of the 50 cases studied in this paper the superior longitudinal sinus route was utilized, and in all cases the blood was citrated.

Citrated blood has been objected to because of reactions following its use. Sydenstricker, Mason and Rivers[7] reported that 17 per cent of their cases had reactions, Lewisohn[8] 20 per cent in 200 cases, Pemberton[9] 21 per cent in over 1000 cases, Drinker and Brittingham[10] 60 per cent, and Clough and Clough[11] in 214 cases collected, found 32 per cent showing reactions. These reactions have been ascribed to a number of causes: injury to the red blood cells by the citrate, liberation of toxic substances from the blood platelets, (Drinker and Brittingham[10]) and changes in the cellular elements (Unger, L. J.[12]).

Of the 50 cases studied, 8, or 16 per cent, showed a reaction following transfusion. In one of these cases there was some agglutination of donor's and recipient's red blood cells, but the transfusion was performed as an emergency measure and as a result there was a violent reaction. In the other six cases, the temperature was elevated approximately 2° F. for 4 to 8 hours, but with no other symptoms.

The more thorough the compatibility tests made of donor's and recipient's blood prior to transfusion, the less likely are reactions to take place.

In 45 of the 50 cases transfused such tests were made, the others in the series being regarded as emergency cases. In none of the latter, however, did a reaction follow. In the 45 cases where compatibility tests were made the bloods were either grouped or were examined for agglutination under the microscope in dilutions of equal parts, 1 to 9 parts, and 9 to 1 parts, of the donor's and recipient's blood respectively.

The superior longitudinal sinus has been condemned by some, on the ground that it might be transfixed in the operation or that it might be ruptured by undue force of the inflowing blood, or might not be entered on account of an anomalous position, etc.

With the proper care and experience such untoward results should not be encountered. It is important that the blood be injected slowly if the syringe method is used or that it be given by gravity.

The amount of blood to be transfused varies with the degrees of anemia and anhydremia present but the maximum amount given up to 15 or 18 months of age should be equivalent to not more than 10 to 15 c.c. per pound of body weight. Smaller transfusions, repeated if necessary, are held by some to be more effective.

The researches of Ashby[13] seem to indicate that the time taken for the elimination of transfused red blood cells varies from 33 to 100 days. This being true, it is readily seen that these babies are tided over the critical period for a considerable length of time by the new blood administered.

The technic of the operation varies with the several methods used. In these cases the citrated blood was administered by the use of 20 mils, in record syringes, one syringe-full of blood being given while another is being filled by an assistant or nurse. Ten mils of a 2.5 per cent solution of sodium citrate in freshly distilled water was used with each 90 mils of blood. It is important that the water should be freshly distilled and the citrated blood should be kept warm. In most of the cases a Goldbloom[14] needle with aluminum block was employed. This device, however, is not necessary.

The beneficial effects from transfusion may be illustrated by giving a brief resume of several cases.

Case III.—Baby P., a female, 19 months old, suffered from infectious diarrhea, acute purulent otitis media, and pyelitis.

Family History.—Two children were living, and none dead. She was born after normal labor and her birth weight was 7 pounds.

Present Illness.—Eight days previously the baby became acutely ill, with high fever and frequent stools. She had had from 20 to 30 bowel movements daily, and had lost weight and strength rapidly. The stools contained blood and there was much tenesmus. She had refused all food for the preceding 2 days and now lay in a stupor.

Physical Examination.—An acutely ill baby, with temperature of 103° F. and stuporous was seen. Her weight was 15 pounds, her anterior fontanelle was depressed, her skin pale and dry, mucous membranes dessicated, gums spongy and bleeding easily, ear drums bulging, liver 2 fingers breadth below the costal margin, and spleen palpable. The urine contained much pus. Her red blood count was 3,500,000; hemoglobin 55 per cent; and white blood count, 7,200.

Paracentesis of the ear drums was performed and the baby was given lactic acid milk and karo by gavage, sodium bicarbonate, small doses of morphia and daily intraperitoneal injections of normal salt solution. For 10 days the frequency of the stools continued and the baby vomited part of the feedings.

One hundred and fifty c.c. of citrated blood were introduced into the superior longitudinal sinus. The donor's and recipient's bloods were in group 1. There was no reaction. After transfusion, the blood count was as follows: red blood cells, 4,150,000; hemoglobin 65 per cent and white blood count 8,600.

The lactic acid milk feedings were retained after the operation and the baby began to improve. Two weeks after the administration of blood the weight was 16 pounds and 3 weeks later it was 17.5 pounds.

Case XXIII.—Baby S., male, age 3.5 months, had fermentative diarrhea.

Family History.—He was the first child, born at full term with low forceps, and his birth weight was 9 pounds.

Previous Feeding.—He was nursed for 2 months, then given Dryco milk.

Present Illness.—He had had frequent loose green undigested stools for 2 months. He had failed to gain in weight and for the preceding two days had had fever.

Physical Examination.—He was a very ill infant, with a temperature of 104° F., lying with half closed eyes in a semi-conscious state. His weight was 9 pounds. The anterior fontenelle was depressed, the ear drums were normal, the skin dry and muscles flabby. The liver was 2 fingers breadth below the costal margin, and spleen palpable. The red blood count was 3,500,000; hemoglobin 45 per cent, and white blood count 14,000.

One hundred c.c. of citrated blood were administered, the blood of the donor and recipient both being in group 1. There was no elevation of temperature following the transfusion. On the following day the red blood count was 4,100,000; hemoglobin 55 per cent and white blood count 12,500.

The infant was fed with lactic milk and karo syrup, and improvement was noticed at once. Ten days after the transfusion, the weight was 9½ pounds, and a week later it was 10 pounds and 5 ounces.

Case XXXXII.—Baby H., a male, age 5 months, was athreptic.

Family History.—Four children were living and well and none dead. He was a full term baby of normal birth, and his birth weight was 10 pounds.

Present Illness.—He had never thrived. He was nursed for a month and then received complimentary feedings, first of Dryco, then Mellen's food, then Eagle brand, then white of eggs and finally chicken broth. He was hungry all the time and weighed one and three-fourths pounds less than he did at birth. He had had occasional attacks of diarrhea, alternating with constipation.

Physical Examination.—He was very poorly nourished, pale with small flabby muscles and mottled skin. He weighed 8¼ pounds. The anterior fontanelle was depressed, the ear drums negative. The thorax showed beading at the costochondral junctions, and flaring ribs. The liver was 2 fingers breadth below the costal margin, the spleen palpable; red blood count 2,836,000; hemoglobin 45 per cent; white blood cells 11,800. The baby was transfused with 150 c.c. of citrated blood via the superior longitudinal sinus. Both donor and recipient were in group 1, and no reaction followed.

The baby's appearance was much improved. The blood count on the following day showed the red blood cells 4,056,000; hemoglobin 60 per cent and white blood count 9,000. He took and retained lactic acid milk and karo mixture.

At the end of a week there was a gain of one-fourth pound. At the end of the second week he weighed three-fourths pounds more than on admission to the hospital. From this point onward there was a steady and consistent gain in weight.

Case XXXVIII.—Baby J., female, age 10 months, had malnutrition following pneumonia, empyema and acute otitis media.

Family History.—One child was living, none dead. She was a full term baby of normal delivery and her birth weight was 8 pounds.

Previous Feeding.—She had breast milk for 5 months, then complementary feeding of cow's milk.

Present Illness.—A month previously the baby had lobar pneumonia and following this empyema for which a rib resection was performed and the side drained. She had had several attacks of acute otitis media which necessitated opening the ear drums. She took her food poorly and through her illness had had 2 or 3 gastro-intestinal upsets with vomiting and loose stools. She was progressively losing weight.

Physical Examination.—She was poorly nourished, pale infant weighing 10 pounds. A sinus discharged a small amount of pus at the site of operation. Her red blood count was 2,500,000; hemoglobin 60 per cent, and white blood count 29,200.

She was given 100 c.c. of citrated blood, donor and recipient being in group 1. No reaction followed. After transfusion the red blood count was 3,500,000; hemoglobin 70 per cent and white blood count 22,000. Her appearance was much improved and she began to take her food much better. The wound in the thorax healed after a week, and 10 days after the transfusion she weighed 11½ pounds, a gain of 1½ pounds.

Aside from transfusions, the general management of these cases consisted of restoring water loss by means of intraperitoneal injections and hypodermoclyses of normal salt solution, giving lactic acid milk in most of the cases, employing tube-feeding when necessary, and in prescribing sodium bicarbonate in those cases showing evidences of acidosis or where there was a complicating pyelitis. It is noteworthy how much improvement in color and pulse volume is shown in these infants after transfusion and how frequently it happens that they are able to retain their feedings which were regularly vomited before the operation.

Summary.—There are 26 males and 24 females. The average age was 10 months.

The average amount of citrated blood transfused was 112 c.c. Of the 24 cases upon

which blood counts were made before and after transfusion, the average number of erythocytes was 2,851,000 and the average amount of hemoglobin was 52 per cent before, as against 4,026,000 red blood cells and 64.2 per cent hemoglobin after the operation. The average increase of red blood cells therefore was 1,175,000 and of hemoglobin was 12.2 per cent.

Thirty-nine babies recovered and eleven died: a mortality of 22 per cent. Eight of the 11 fatal cases were moribund when transfused.

Conclusions.—(1) Blood transfusion in certain states of malnutrition in infancy is a most valuable form of therapy.

(2) The types of cases in which it is chiefly indicated are (1) those infants who either in the course of, or following acute diarrhea, are in a state of anhydremia in (2) cases of athrepsia and (3) in state of malnutrition brought about through some parenteral infection.

(3) Citrated blood via the superior longitudial sinus is a safe and satisfactory method of blood transfusion in infancy.

(4) Reactions following transfusion with citrated blood are rarely severe in infancy and can be reduced to a minimum by careful compatibility tests of donor's and recipient's blood, by using freshly distilled water for the sodium citrate solution, and by injecting the warmed citrated blood slowly.

(5) The pediatrician should be qualified to perform blood transfusion in infancy.

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DISCUSSION (Abstract)

Dr. W. W. Harper, Selma, Ala.—The essayist has brought to our attention a therapeutic measure which I believe we are going to use more and more. The Massachusetts General Hospital, I believe, originated the method of using the superior longitudinal sinus, but they have now practically abandoned it because they say it is dangerous. It is almost as easy, if you get the technic, to give a direct transfusion by the Kimpton-Brown tube. In giving transfusions, the donor absolutely must type up with the one receiving it. If the donor and recipient do not type, even though they be daughter and mother, and you give the transfusion, you might as well have taken a pistol and shot the patient through the head. They die instantly. A method which every one can use is to give whole blood subcutaneously or intramuscularly.

Dr. L. von Meysenbug, New Orleans, La.—Since the work of Sipperstein, in Minneapolis, showing that blood can be injected into the peritoneal cavity and obsorbed almost as rapidly as if injected into the vein, I do not see any excuse for going into the longitudinal sinus. I happened to be the interne on Dr. Talbot's service at the Massachusetts General Hospital and gave the first transfusion into the longitudinal sinus, in that institution. I must say I was frightened when I did it and the procedure was abandoned before I left the hospital. I saw a very unfortunate occurrence in New York, at a lying-in hospital. Evidently the needle was not in the sinus. When the infant came to autopsy the blood had been injected over the cortex, and down into the ventricle. In giving clear solutions into the sinus you can pull back on the syringe, if you are using a syringe, and get blood, thus checking the position of the needle, but if you are giving blood you can not do that.

Dr. C. E. Conrad, Harrisonburg, Va.—The intraperitoneal route, gives just as satisfactory results as the intravenous, with practically no reaction.

Dr. Borden S. Veeder, St. Louis, Mo.—I wish to emphasize the importance of transfusion in handling the dessicated, athreptic infant. Very often after a blood transfusion one can leave an infant on a diet on which it has not been gaining and watch the weight curve rapidly increase. I do not think that the importance of blood transfusion can be over emphasized, and I am sure that it is frequently overlooked.

Dr. Root (closing).—Criticism of the use of the sinus is perhaps justified. I have given a great many sinus transfusions, not only in states of malnutrition but in other conditions, such as hemorrhagic disease of the new born, and I have not in any case had untoward results. I have just returned from visiting clinics in New York, New Haven and Johns Hopkins. While the sinus is still used for intravenous therapy, there is a tendency to get away from this method and to use some superficial vein, such as the external jugular. I cannot feel that giving the blood intraperitoneally is anything like giving it into the vein. In many of these cases the child is nearly moribund when it comes in. Blood transfusion in these cases is almost as much of an emergency measure as operation in acute osteomyelitis. The use of the sinus is open to criticism, but I have not yet abandoned the method.

TROPICAL DISEASES AND PUBLIC HEALTH

THE UNIFICATION OF MILK CONTROL BY STATE HEALTH DEPARTMENTS*

By LESLIE C. FRANK,
Associate Sanitary Engineer, U. S. Public Health Service,
Montgomery, Ala.

The past two years have witnessed an ever increasing desire on the part of state health officers to improve the chaotic condition of milk sanitation now existent in their respective states. Thus far six states have determined to attack the problem in accordance with a plan recommended by the United States Public Health Service. The first of these was Alabama. Because of the rapid spread of this work it was thought that its nature might be of general interest and for that reason a description of the plan forms the subject matter of this paper.

An inspection of the existing conditions in the cities in the State of Alabama disclosed the fact that a number of the cities had no milk legislation of any kind; that of the ordinances which were in effect no two were alike; that only one or two cities were really enforcing milk legislation; that in the several cities which were really enforcing milk legislation the dairy industry and the health authorities were in almost constant conflict; and that in one of these cities the friction had become so great that the dairymen had taken the health officer to the woods and beaten him unmercifully.

Certainly not an encouraging picture! There could be no question as to the need for an adequate remedy. Why was it that so few of the cities attempted proper milk sanitation? What was the cause for the great variation in types of milk legislation? Why was there so much friction between the health departments and the dairy industry when the former attempted to enforce milk control?

It soon became apparent that one of the principal factors responsible for these conditions was the absence of any coordinating and directing agency in the state. The majority of smaller and middle-sized and some of the larger communities in most states have failed to reach an adequate standard of milk sanitation partly, at least, because the health and other officials are bewildered by the different kinds of milk legislation now extant in this country. Very few local health officers have special training in milk sanitation and it is accordingly not to be wondered at that, observing so many different practices, they hesitate and in many cases fail to act.

Where local health officers have conceived the necessity of some kind of control, the lack of any expressed unity of thought among authorities in general has engendered the practice of creating patchwork ordinances. They have each independently brought together the ordinances from a number of cities and chosen sections here and there to suit the individual taste. The result has been, of course, a hodge-podge of milk legislation.

This great diversity of methods of milk control has naturally led dairymen to resist milk legislation because they consider that legislation to be the invention of their particular health officer and hence a menace aimed at them by an individual rather than a rule of dairy conduct accepted and enforced by health officers in general throughout the state or country, and it has resulted in an unfortunately large number of court decisions unfavorable to health departments.

This state of affairs seems bound to continue until some coordinating agency arises to correct it. So long as most city health departments are forced to confess to the dairy industry and to the courts that the practice of milk sanitation is anything but uniform in the United States, so long will the dairy industry and the courts conceive that among all of the varying practices some must be wrong, and that very possibly their own city may be wrong.

It seems reasonable to believe that if the milk legislation and control of a given state, or better still, of the United States, could be unified; if some agency could begin to operate whose function it was gradually to bring health officers to think alike in matters of milk sanitation, then would the dairy industry in a given city begin to feel that the restrictions with which it is surrounded are valid restrictions, arrived at through group judgment, and not lightly to be attacked. Then it is believed court cases would be far less numerous and be freed of the dis-

*Read in Section on Public Health, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

turbing element of conflicting evidence as between health authorities.

If, for example, the practice of grading milk and of requiring the grade to appear upon the bottle cap were universal throughout the United States, and a dairyman should then refuse to comply with this requirement, he would meet with short shrift from the courts. In fact, it is extremely unlikely that a dairyman would permit a court case to occur under these circumstances.

To sum up, then, it appears that the shortcomings of the present include lack of effort in many cities, the existence of very dissimilar types of legislation and control in cities which attempt control, conflict between the dairy industry and the health department, and the all too frequent failure to prosecute court cases successfully. Most of these shortcomings would seem to be the result of the lack of unity of thought among health officers.

What coordinating agency is best fitted and most likely to bring about this much desired unity of thought? It seems logical to believe that as between the individual cities of a state the logical coordinating agency is the state health department, and as between the individual states of the Union the logical coordinating agency is the United States Public Health Service. It is practically always the health departments of cities which have charge of milk control, and it is for this reason that it is believed that the State and Federal health authorities constitute the logical coordinating agencies.

In this paper it is intended to confine the discussion to the problem of the individual state; and the next inquiry must therefore be: In what manner can the state health department best form its coordinating function? The question at once arises whether or not the proper solution is a state law. For some states it may be, particularly such states as have already established the precedent of milk control through state law. In many states, however, (and this is true of Alabama) this precedent has not been established, and under these circumstances it is to be doubted whether the wisest solution, in the beginning, at least, is state law.

With this decision reached for Alabama, the only other method of carrying out the state coordinating function seems to be the formulation of a standard milk ordinance, the promotion of its passage by the various cities of the State, the guidance of its enforcement and the measurement of its results. This, in brief, is the program which the State of Alabama was advised to adopt and which it has since put into effect.

The first problem was the formulation of the Standard Ordinance, but before this could be done it was necessary to be clear as to the precise function of the proposed standard. Briefly, it was determined that the proper function of a good milk ordinance is to promote the production of safe milk without shrinking the supply. In this connection it seems clear that one of the greatest sins a health officer can commit is to write and enforce such regulations as will discourage dairymen from producing milk and thus reduce the amount of milk available. All things considered, milk has done far more good than harm. It is true that hundreds and probably thousands of milk-borne epidemics have occurred since the distribution of milk became a sizable business, but on the other hand it is easy to conceive that entire withdrawal of milk from a city would do far more damage than all the epidemics which that milk, uncontrolled, might cause in that city. It seems to be just as much the health officer's duty to encourage the consumption of enough milk as it is his duty to encourage the production of safe milk. Both of these objects, and they are not conflicting, should therefore be kept clearly in mind in designing milk-control legislation.

Again, before proceeding to the detailed work of formulating the Standard Ordinance it was necessary to be quite clear as to what was meant by "safe milk." The question was, therefore: "Is the highest grade of raw milk which it is possible to produce, safe milk?" After much consideration the final answer was a decided negative. This decision was reached for the following reasons:

(1) Tuberculin testing, while valuable and to be regarded as an advisable precaution in the production of milk, whether raw or pasteurized, cannot be depended upon to keep all milk from tuberculous cows off the market. Very few years elapse in which reactors are not found among herds which are tested annually. The question must always be answered: "What of the milk from these reactors during the interval between tests?"

(2) Employes at dairies cannot be depended upon to recognize and report the first symptoms of infective conditions early enough to insure that they may not infect the milk. Personal experience recalls a case of diarrhea upon a certified dairy which was not reported by the employe for twenty-four hours after it had begun.

(3) Employes can be in an infective condition for forty-eight hours preceding the first

symptoms of certain acute infectious diseases. No possible extent of vigilance can safeguard against infecting milk in this way.

(4) The search for healthy carriers, particularly of typhoid fever, while important and to be considered a desirable safeguard for all milk, cannot be depended upon to disclose every carrier. It has hitherto been assumed that the percentage of healthy typhoid carriers among the general population was probably not on the average above one half per cent. Improved technic, however, will probably show the incidence of carriers to be much higher than this.

If we remember, also, that healthy typhoid carriers are almost always intermittent in the discharge of bacillus typhosus, it will be clear that no reasonable amount of search can disclose every carrier. As before stated, the search should be made and all carriers found eliminated from the industry, but this should be regarded as one factor of safety only and not as a complete protection against typhoid fever.

The above reasoning applies to certified milk, Grade "A" raw milk, or to any other "highest grade" of raw milk.

For the above reasons, the conclusion was inevitable that the highest grade of raw milk it is possible to produce cannot be considered sufficiently safe. It was impossible, therefore, for the Service to recommend to the Alabama State Board of Health any other than the following policy, namely, that while the safety of raw milk undoubtedly increases as the precautions surrounding it increase, no milk, however carefully safeguarded, can be considered entirely safe in its raw state, and that ultimately, therefore, all milk should be properly pasteurized.

Attention is called here to the term "properly pasteurized." Much damage has been done to the reputation of scientific pasteurization by the practice of slipshod and unintelligent pasteurization. Pasteurization cannot be considered to deserve its name unless it is correct pasteurization. Again, milk must be pasteurized not only intelligently but also in apparatus properly designed for correct pasteurization.

The definition of safe milk as adopted under the present studies, was, therefore, as follows: "Safe milk is high grade raw milk, properly pasteurized or boiled." It is now possible to approach the problem of designing the proposed Standard Ordinance.

Among the many ordinances in use in the United States there seem to be three general trends: (1) A type of ordinance which boldly and simply requires that all milk be pasteurized; (2) An ordinance which divides milk into two classes, raw and pasteurized, imposes certain conditions of production and distribution upon each, but does not grade either; (3) A type of ordinance which divides milk into two classes, raw and pasteurized, and then further divides each class into grades according to the care with which the milk has been produced, processed and distributed.

It was natural, in view of the above mentioned definition of safe milk, to consider immediately the adoption of the first type of ordinance mentioned, namely, the one which flatly requires all milk to be pasteurized. This type of ordinance was, however, quickly discarded as a possible state standard. It should be kept in mind that in order to achieve the maximum result, the State Standard Ordinance must be one which the communities of the state can be expected to enact, and if one thing has been learned beyond a doubt in this work it is that the majority of cities in a state will not pass a universal pasteurization ordinance. This, of course, is stated as being true of today only. It may not be true ten years hence.

Now it cannot be denied that raw milk does become safer as it becomes better safeguarded. Does it not seem clear that the state is unwise which assumes the position of negotiating with and assisting only such cities as will pass a universal pasteurization ordinance? On the contrary, from the standpoint of the greatest good for the greatest number, must it not be admitted that the state's function, where it cannot secure universal pasteurization, is to encourage the maximum percentage of pasteurized milk and the maximum safeguard for that part of the milk which is sold raw?

For the above reasons the universal pasteurization type of ordinance was discarded as a possible state standard. In this connection the distinction should be noted between the term "Standard Ordinance" and the term "model ordinance." A "model ordinance" might very well be a universal pasteurization ordinance. It is a model, an ideal to be striven for, whereas a "standard ordinance" is here interpreted to mean an ordinance which will accomplish the greatest good in the shortest time.

Attention was next directed to the second type of milk legislation, namely, the type which divides all milk into two classes, raw and pasteurized, surrounds each with certain requirements, but does not grade either.

If there is any type of milk legislation which is more widely used than any other it is this type, and for this reason it was very carefully considered as a possible state standard. It was finally discarded, however, for two principal reasons.

The first is that it assumes, if adopted as a state standard, that no cities in the state could be convinced as to the desirability of requiring all milk to be pasteurized. The ordinance provides at once for the sale of some raw milk and defines the character of raw milk which will be permitted to be sold raw. It was believed that it would be just as unwise for the state to assume that no cities would pass a law requiring all milk to be pasteurized, as it would for the state to assume that many cities would pass an ordinance requiring all milk to be pasteurized.

The second reason for discarding this type of ordinance as a state standard was that it does not provide sufficient incentive for the production of a high grade of raw milk for pasteurization purposes. Because of the fact that only one grade of pasteurized milk is provided for in such an ordinance, the requirements for the raw milk permitted to be used for pasteurization must be absolutely minimum requirements below which the raw milk is forbidden the market entirely. Accordingly, most of the ordinances of this type require that no milk may be pasteurized which contains more than 1,000,000 bacteria per cubic centimeter, and no credit whatever is given the producer whose bacterial count is less than this. Hence, producers have no incentive to keep their average bacterial counts much below a million, and in point of fact, in most cities operating under this type of ordinance, the bacterial count of the milk which is pasteurized is only too frequently above 500,000 and often above a million.

For the above reasons, much more favorable consideration was given to the third, or grading, type of ordinance. This type of ordinance provides for both raw and pasteurized milk and grades both according to the conditions under which they are produced, handled, pasteurized, and distributed and according to the results of laboratory analyses of the milk. Under this type of ordinance the pasteurized milk must carry a grade mark which is partly dependent upon the quality of the milk which is pasteurized. Hence, the pasteurization plant has an immediate incentive to pay more for high quality raw milk than for low quality raw milk. Under these conditions the producer feels that he is being paid a price commensurate with the care he has taken in producing his milk.

There were several features of the type of grading ordinance usually employed which were not considered advisable. The first of these is the fact that the ordinary type of grading ordinance, similar to the non-grading ordinance previously referred to, assumes that all cities will permit some milk to be sold raw.

One well-known state standard ordinance, for example, states that all milk sold shall be of one of the following grades: Certified, Grade "A" Raw, Grade "A" Pasteurized, Grade "B" Pasteurized. This ordinance assumes that all cities in the state will permit Certified and Grade "A" Raw Milk to be sold to the final consumer without pasteurization.

Another characteristic of the usual type of grading ordinance is that it bases the grading of milk partly upon the score of the dairy, and provides that Grade "A" Raw Milk, for example, shall come from dairies scoring at least 75 per cent, or in other cases, 85 per cent. The items of sanitation with which a dairy should comply number at least twenty-five or more on any reputable score card, and no one item can be assigned very many points in a possible total of one hundred. Hence, a dairy may omit one or more important items of sanitation and still attain a score of 75 per cent or 85 per cent, and thus be entitled to a Grade "A" rating, unless all important items are specifically mentioned in the ordinance as being required in the production of all milk. In the latter case the ordinance becomes rather awkward and difficult to understand on the part of the producer. It is easy for him to understand that if he attains a score of 85 per cent he is entitled to a Grade "A" rating, but when, despite this fact, he is told that the violation of certain specific requirements has robbed him of his grade, his immediate question is: "Well, then, what is the use of the score?" In order to correct the above shortcomings, the usual type of grading ordinance was modified and given the following form:

The ordinance requires that all raw milk, whether it is to be pasteurized or not, is to be graded in accordance with certain requirements. Instead of the grade being based partly upon a numerical score card, Grade "A" Raw Milk is defined as milk which meets every one of a certain definite list of requirements. Grade "B" Raw Milk is defined as milk in which one or more of certain of these requirements have been found to be omitted or modified, the omis-

sions or modifications being minor in degree. Grade "C" Raw Milk is defined as milk which has failed to meet any one of a certain group of additional requirements, some of which are major in degree. Grade "D" Raw Milk is defined as all other milk. This avoids altogether the numerical score and causes Grade "A" Raw Milk to be a definite, known quantity.

The Standard Ordinance next contains a section which is left blank but which is intended to designate the grades of raw milk which shall be pasteurized. The foreword to the ordinance contains a recommendation that in all cities where the pasteurization facilities are or can be made adequate, this section should require that within twelve months of the date of passage of the ordinance all grades of milk shall be pasteurized. The foreword further states, however, that if insistence upon complete pasteurization should threaten to result in failure to pass any milk ordinance, the section be written to permit Grade "A" Raw Milk to be sold raw. It is believed further that an intermediate attempt should be made to limit the sale of raw milk to certified milk.

The Standard Ordinance next requires that the grading of pasteurized milk shall be based both upon the quality of milk which is pasteurized and the conditions surrounding the pasteurization process itself. Grade "A" pasteurized milk is defined as "Grade "A" or Grade "B" raw milk pasteurized in a plant which meets every one of a certain definite list of requirements. Inasmuch as Grade "B" raw milk is milk which has met all major requirements of production this means that Grade "A" pasteurized milk is a high quality raw milk, properly pasteurized.

Grade "B" pasteurized milk is a fair quality raw milk, properly pasteurized. Grade "C" pasteurized milk is defined as all other pasteurized milk, and must be marked "For cooking and manufacturing purposes only."

By the above means the objections to the usual type of grading ordinance were overcome.

The Standard Ordinance adopted requires that all bottles and other containers of milk show the grade mark and that all restaurants, soda fountains, and similar establishments display a placard indicating the grade of milk sold therein.

The next part of the program was to bring about the passage of the Standard Ordinance by the various municipalities of the state. Thus far eight Alabama municipalities have enacted the Standard Ordinance. Experience in securing the passage of the standard legislation in these cities has indicated a number of items of policy.

In the first place, it was found to be wise for the health officer to take the dairy industry into his confidence in proposing the passage of the Standard Ordinance. Otherwise the industry is apt to develop a resentful attitude which will later make enforcement difficult. On the other hand, it was found unwise to make the passage of the Standard Ordinance entirely dependent upon the will of the dairy industry. This would make the dairy industry the dictator of the kind of milk which should be served to a community, whereas as a matter of fact it is the consumers, represented by their health officer, who should have the final decision as to the quality of milk which will be tolerated by a community.

Again, great care should be taken to make clear at the outset the attitude of the health department as to the relative safety of the raw and pasteurized grades. Otherwise the dairy industry is apt to assume that the health department will recommend equally Grade "A" Raw and Grade "A" Pasteurized milk, and if they find that this is not the case after the ordinance goes into effect they will conclude that the health department has misled them and will thus develop a spirit of resentment which should by all means be avoided.

The final item of policy which it was found advisable to observe in securing the passage of milk legislation was that it should not be attempted to begin a campaign for better milk and the passage of the State Standard Milk Ordinance without first having discussed the matter with the highest city officials. Sometimes a local health officer, after having been approached by the State Health Department, will in his enthusiasm begin immediately to develop public opinion in favor of the Standard Ordinance and overlook consulting the mayor and other officials first. This may seem to be a small matter, but in one instance, at least, the city administration believed an attempt was being made by the state and local health departments to force a favorable decision and resentfully delayed the passage of the ordinance for many months.

In general, the best policy to adopt in securing the passage of the Standard Milk Ordinance would seem to be to have the local health officer advise the mayor and other city officials: first,

that after a conference with the State Health Department he has decided to recommend officially that the city adopt the Standard Ordinance, and recite the advantages, both to the dairy industry and to the consuming public; second, that if the city officials think there would be any likelihood of political embarrassment in passing the ordinance, he, the health officer, will be glad to develop public opinion in favor of the ordinance. In the majority of cases this will prove unnecessary.

Then with regard to the dairymen a wise plan seems to be to call them together in meeting and advise them of the definite intention of the health department to recommend the Standard Ordinance to the city authorities. The dairymen should be clearly informed why such regulation is necessary and that its impartial enforcement will be to the advantage of the industry by increasing the confidence of the public in milk as a food and thus increasing the consumption of milk by eliminating unfair competition through the grading principle, and by reducing milk-borne epidemics, which are always disastrous to the industry.

The attitude of the health department on pasteurization should then be carefully explained. The dairymen should be advised that if the city insists on allowing raw milk to be sold the health department will be forced as a matter of duty to advise the public repeatedly of the greater safety of properly pasteurized milk, and that this advice will constantly be before the public on the grade placards which the Standard Ordinance requires all restaurants, soda fountains, etc., to carry.

Having now formulated the State Standard Ordinance and secured its enactment in a number of the cities of the state, the next problem was to insure its enforcement. Unfortunately, enforcement does not follow as a matter of course. Political interference, lack of proper special training of the health officer and his inspectors, lack of sufficient funds and personnel, somtimes even indifference on the part of the local health officer or the other city officials —one or more of these factors are apt to result in poor milk control. The statement is regretted, but it is nevertheless believed, that if a state health department were merely to formulate a standard ordinance and secure its local adoption not more than half the cities of the state would benefit.

The state cannot stop there. It must not merely secure the general adoption of a method as standard. It has another function: it must see to it that the method is carried out. It seems difficult, and it is probable that no state will succeed entirely, but the state can study the various causes of non-enforcement and attempt to overcome them.

One of these possible causes, as has been indicated, is the lack of sufficient funds and personnel. This cause is usually operative only in the smaller municipalities. These do not usually have a well-trained milk inspector and practically never have a bacteriological and chemical laboratory. How can the state help here? In the case of Alabama a simple remedy has been employed. The State Health Department has added carefully trained dairy inspectors to its staff and has arranged to have the milk analyses done in the central or in one of the branch state laboratories.

Each state dairy inspector is responsible for a group of municipalities. (Experience thus far indicates that one inspector can handle about five or six small towns). His duties are:

(1) To train local inspectors in the inspection of dairies and pasteurization plants, in the routine collection of milk samples, in the determination and announcement of grades, and in the general enforcement of the ordinance.

(2) To supplement the work of local inspectors when necessary.

(3) To determine periodically the municipal milk sanitation ratings of the group of towns for which he is responsible.

The above plan has proved quite satisfactory in Alabama, although the problem of reimbursement of the state by the local communities has not as yet been attacked. It is possible that ultimately each town should reimburse the state on a pro rata basis, but the policy has been adopted in Alabama of deferring the consideration of this question until some time in the future when the consumers of the cities will have had a sufficiently long experience with milk control to make it quite certain that they will support a request for reimbursement. It is obvious, of course, that the cost to each small community under this group plan will be much less than under a plan whereby each community establishes its own complete laboratory and inspection service.

Another factor frequently resulting in unsatisfactory local milk control is the lack of special training of the health officer and his inspectors. The employment of specially trained inspectors by the State Department of Health also helps to solve this problem inasmuch as one of the duties

of these inspectors and of their bureau chief, as above stated, is to acquaint the local health officials with such special knowledge of modern milk control methods as they may not already possess.

The two other factors sometimes resulting in unsatisfactory local milk control are political interference and occasional indifference on the part of the local health officer. After careful consideration the Public Health Service decided to recommend to the Alabama State Department of Health that one good plan for reducing these causes would be to have the State Department of Health grade the milk sanitation of cities just as the municipal department of health grades the milk sanitation condition of individual dairies. It was believed that if this could be done, political interference would be somewhat less apt to occur, as a resultant low rating of the city by the state would be apt to meet with criticism on the part of citizens and on the part of special organizations, such as the Chamber of Commerce, men's luncheon clubs, and women's organizations. It was further believed that the routine announcement of such municipal milk ratings by the state would tend to discourage indifference on the part of the health officer for the same reasons.

The above recommendations made it necessary to devise a method for measuring the milk sanitation status of cities, and this was the final problem to be solved. It is impossible in this paper to include a detailed discussion of the rating plan which was finally recommended, but, briefly, the method involves the determination of the percentage of the city's milk supply which complies with each of the items of sanitation required in the ordinance for the ideal milk supply. Each item of sanitation is assigned a maximum possible credit. Then the maximum possible credit for each item is multiplied by the percentage compliance previously determined, which gives the earned credit for each item. The sum of all earned credits, divided by the sum of all maximum possible credits, gives the municipal milk sanitation rating.

As previously stated, the periodic determination of the milk sanitation ratings of the cities of the state is a further function of the state milk inspectors.

CONCLUSION

It will be observed that a state which carries out the program above outlined will have accomplished the four objects originally determined upon as necessary, namely: It will have formulated a standard ordinance designed to promote the production of safe milk and the consumption of enough milk; it will have secured the adoption of the Standard Ordinance by the cities of the state; it will have stimulated and supervised the enforcement of the standard ordinance; and it will have measured its results.

DISCUSSION (Abstract)

Dr. A. T. McCormack, Louisville, Ky.—We regard milk as the most important health product we have. The United States Public Health Service has done many great things. The campaign in Kentucky with Dr. McMullen for the eradication of trachoma, saving us from the pandemics of Brazil, Egypt and China, was a glorious work. We all ought to take a lesson from Alabama's experience and duplicate its results.

SURGERY

RAILWAY, INDUSTRIAL, GYNECOLOGICAL, OBSTETRICAL AND UROLOGICAL

BONE TUMORS*†

By BARNEY BROOKS, M.D.,
St. Louis, Mo.

From the practical standpoint all bone tumors may be divided into three groups: (1) Clearly benign tumors; (2) clearly malignant tumors; and (3) tumors intermediate between groups one and two.

The first group of bone tumors contains all those tumors which are generally recognized as new growths which do not invade the adjacent tissues or produce distant metastases. Examples of the clearly benign tumors are osteoma, chondroma, and benign bone cyst. It is not the purpose of this paper to discuss these tumors. It is necessary to say only that there is usually no difficulty in their diagnosis or treatment. The second group contains those tumors which produce distant metastases. The characteristic example of this group is the periosteal sarcoma. It is generally known that prognosis of these tumors is extremely grave regardless of how radically they may be treated. Bloodgood, in an extensive investigation over a number of years, has not been able to find the records of more than two cases which have remained well. In my own experience I have known of but one case which has remained well for a period of two years. The third group of bone tumors is intermediate as regards malignant characteristics. These tumors invade and destroy the adjacent tissue, but do not produce distant metastases. The clinical characteristics of these tumors are similar to the very malignant group. The existence of this group of bone tumors is not generally appreciated and the treatment instituted for them is often more radical than is necessary for their cure.

The term sarcoma of bone should be applied only to the second and third groups.

Sarcoma of bone is generally known to be a disease of unfavorable prognosis. When, therefore, the diagnosis of sarcoma of bone is made the surgeon often assumes the attitude that he is dealing with a hopeless disease. He is likely to recommend an immediate radical amputation, and feel that this procedure offers little hope of permanent cure. Some surgeons have come to assume that this disease is so hopeless that it is wisest to recognize at the beginning the uselessness of attempting to relieve the patient by surgical means and to recommend the use of such measures as Coley's toxin, x-ray or radium.

The fact is, however, that there are different kinds of bone sarcoma. There is one kind which is rarely if ever, cured. Another is cured by any measure which results in a complete local eradication of the tumor. It is not always possible to distinguish these bone sarcomata by clinical history, x-ray findings, or even by microscopical examination. The assumption, therefore, that all cases of sarcoma of bone are hopeless leads to useless radical mutilating operations or to delay until local extension of a non-metastasizing tumor has proceeded to such an extent that a radical mutilating operation is necessary for its removal. I have made both these mistakes and I can, therefore, speak candidly without criticizing any one but myself.

In the study of the surgical treatment of bone tumors the emphasis should always be placed on those cases which have been cured. It is the knowledge which will be obtained by their study which will lead us ultimately to the proper surgical treatment of bone sarcoma. This at least will be true until the discovery of some method for treating the most malignant diseases.

From the practical standpoint, therefore, all bone sarcomata may be divided into two groups. In one group the tumor forms metastases. In the other group the tumor may infiltrate and destroy the adjacent tissues, but forms no distant metastases. At the present time there is little to be hoped for in the treatment of the first group, because bone tumors which form distant metastases probably do so before even the earliest symptoms appear. The last group is always cured by any measure which results in a complete local removal of the new growth.

It is the purpose of this paper to describe briefly our experience in the treatment of bone tumors and particularly to describe in detail

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*Read in Section on Bone and Joint Surgery, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

†From the Department of Surgery, Washington University Medical School, St. Louis.

those instances in which we were apparently dealing with a sarcoma of bone and yet in which the patient has been cured. The small number of these cases encountered is an additional reason for recording them in the literature, as it is only by the gathering together of a large number of cases that knowledge will be obtained to establish general principles for the correct treatment of this disease.

In the past nine years we have seen eighty-three instances of primary bone tumor in adults. Of these eighty-three cases, sixty-one have been of the clearly benign type including osteoma, chondroma, osteochondroma, and benign bone cyst. In twenty-two cases the diagnosis of sarcoma has been made. Of these twenty-two cases, fifteen have been of the clearly malignant type and all of these patients are dead except two. One of these is near death from extensive pulmonary metastases approximately one and a half years after onset of the disease, and the other is apparently well, two years after onset of the disease, with x-ray treatment. The seven remaining cases are to be considered particularly in detail because five of them are alive and have been apparently cured for three or more years. One case with a sarcoma apparently of the relatively benign type died as a result of operation. One case of giant cell sarcoma has been very recently operated upon. In addition to these cases we have seen three cases of multiple myeloma, all of which died within two years after the onest of the disease.

A brief summary of the records of eight cases will serve to illustrate the conclusions which have been reached from this study.

Case 1.—N. S., a white man, age 54, was admitted to Barnes Hospital June 1, 1920. Three months previously he was climbing through a fence when he fell and broke the left femur. He was treated with applications of splints, but the fracture did not heal. He has lost twenty-five pounds in weight. On examination, a large fusiform swelling was observed in the middle of the left thigh. There was a fracture of the femur, the leg being flail. The x-ray showed extensive destruction of bone in the middle third of the shaft of the left femur with pathological fracture. X-ray of the chest was negative. Two days after admission to the hospital a specimen of tissue was excised and found to be a spindle cell sarcoma. The patient's general condition was such that he was given a blood transfusion after which he improved to such an extent that a radical hip joint amputation was performed on July 2, 1920. This operation consisted in a preliminary ligation of the common iliac artery. Anterior and posterior skin flaps were reflected. The muscles of the thigh were divided at their origin from the pelvic girdle and the hip joint was disarticulated. The wound was closed without drainage. The post-operative course was uneventful. The patient was discharged July 25, 1920. The condition of the patient at time of discharge is shown in Figure 1.

Fig. 1.—Photograph showing the extent of operative removal of the extremity, Case 1. Note the operation scar on the abdomen from the intra-abdominal ligation of the common iliac artery.

October 8, 1920, letter from the patient's family physician stated that his general condition was excellent, and he had gained in weight and strength. He was able to get about with crutches and stated that he felt no discomfort or pain.

October 3, 1921, letter from the patient's family physician stated that the patient was dead. Before death, masses could be felt in the lower abdomen.

Case 2.—R. G., a white man, age 26, was admitted to Barnes Hospital June 12, 1923. The first symptoms noted in April, 1922, were pain and soreness in the right thigh. In March, 1923, swelling was noticed and the patient consulted a surgeon who removed a piece of tissue from the tumor. Microscopical examination of the specimen removed showed sarcoma. On admission to the hospital, the right thigh showed a spindle-shaped swelling in its middle third. The recent incision for removal of tissue was healed. X-ray showed some bone destruction and bone proliferation in the middle third of the shaft of the right femur. X-ray of the chest was negative. The patient was suffering from such intense pain as to require large quantities of morphin. The patient was a son of a physician to whom the condition was explained, and he wished to have the extremity amputated for the relief of pain.

On June 16, 1923, a radical hip joint disarticulation was performed after preliminary ligation of the common iliac artery. The post-operative course was complicated by some elevation of temperature associated with a cough and sputum and signs of pulmonary consolidation. The operative wound healed and there was relief of the severe pain in the thigh. He was discharged from the hospital August 16, 1923, and died on November 15, 1923. A few weeks before death a nodule, apparently a recurrent sarcoma, developed in the region of the coccyx.

Case 3.—A. R., a white girl, age 8, was seen in consultation with Dr. Edmond Bechtold, of Belleville, Illinois, to whom I am indebted for the case record. The patient was first seen December 14, 1921, at which time the child had complained of pain in the right upper arm for a period of approximately two months. On examination there was a fusiform swelling of the middle third of the right arm, slightly tender. X-ray examination showed bone destruction and new bone formation in the middle third of the humerus.

December 15, 1921, an exploratory operation was performed with removal of a piece of tissue for diagnosis. Microscopical examination of this showed a typical periosteal spindle cell sarcoma, and immediate intensive x-ray therapy was begun. There was definite improvement in the general condition of the patient and the swelling of the arm became distinctly less. X-ray examination April 10, 1922, showed a remarkable healing of the bone destructive process and an apparent cessation of the periosteal proliferation.

November 17, 1922, the patient returned because the arm had begun to swell. Examination showed local recurrence of the tumor in the soft parts of the arm. The x-ray examination of the bone gave no marked evidence of bone destruction or new bone formation. X-ray examination of the chest was negative.

November 18, 1922, disarticulation of the shoulder joint was done. Post-operative convalescence was uneventful. January, 1923, a letter from the patient's mother reported the death of the child after the formation of lumps all over the body.

Case 4.—C. R., a white man, age 33, was admitted to Barnes Hospital June 16, 1921. He was a coal miner by trade who had never had any difficulty whatsoever with his extremities until four weeks previously, when a falling timber twisted his right wrist. The accident was only slightly painful at the time, but was followed immediately by a progressive enlargement of the wrist. On examination the right wrist was tremendously swollen, red, and painful. Motion in the wrist was completely absent. X-ray examination showed a complete destruction of the distal end of the radius. The rapid growth and the short duration of the disease with extensive bone destruction without x-ray evidence of a progressive distension of the bone led to the diagnosis of sarcoma and amputation was advised, it being believed that the tumor was of a very malignant type. On June 21, 1921, a tourniquet was applied. Incision into the tumor showed the presence of tumor tissue in all the soft parts about the wrist. There was no evidence of encapsulation and the tumor did not have the gross pathological characteristics of a giant cell sarcoma. The arm was, therefore, amputated through the middle third. Microscopical examination of the tumor showed it to be very cellular, containing many giant cells. The giant cells were of the multinuclear variety, but the stroma was more cellular than is usually seen in the benign giant cell sarcoma. Convalescence was uneventful, and the stump healed well. The patient was discharged from the hospital June 30, 1921. A report from the patient in October, 1924, three years and four months after amputation stated that he was in good health.

Case 5.—J. C., a white man, a senior medical student, age 26, was seen first in June, 1921, at which time he complained of a "catch" in the left shoulder. X-ray examination was interpreted at the time as negative. A few days after, the patient left the city, and one month later while in swimming he had a severe pain in left shoulder. At this time he consulted another surgeon, and x-ray examination at this time showed a definite destructive process in the proximal end of the humerus. A diagnosis of sarcoma was made.

July 15, 1921, the tumor was explored by Dr. E. R. Ryerson, of Chicago, who removed it with a curette. Sections showed a giant cell sarcoma. Following the curettage in October, 1921, the patient was treated with radium in the service of Dr. Howard A. Kelly of Baltimore. He was seen again by me November 10, 1921, at which time there was some pain and limitation of motion in the shoulder and the x-ray appearance shown in Figure 2. The pain in the shoulder continued and

Fig. 2.—X-ray photograph, Case 6, January, 1922, showing the progressive enlargement and destruction of the proximal end of the humerus. Definite local recurrence of the tumor.

a progressive enlargement in the deltoid region was noticed. X-ray examination January 16, 1922, showed a progressive enlargement and destruction of the bone. Resection of the humerus was advised. At operation on January 24, 1922, the tumor was found to have extended beyond the bone shell into the soft parts. A complete extirpation of the tumor and upper third of the humerus was performed. Microscopical sections showed the typical medullary giant sarcoma. The extension of the tumor into the soft parts was so great that it was felt wisest not to attempt to bridge the bone defect with a transplant at the time of the resection of the tumor.

In January, 1923, the patient returned for examination. There was no evidence of local or metastatic recurrence of the tumor. The functional result of the flail shoulder was surprisingly good. It was thought, however, that the functional result could be improved by filling the defect with a bone transplant. At operation on March 10, 1923, the defect in the humerus was filled with a transplant of the anterior two-thirds of the upper half of the fibula, the head of the fibula being placed in the glenoid cavity and the transplant and the stump of the humerus interlocked. In September, 1923, approximately six months after the operation the patient wrote that he was in perfect health and was not handicapped in any way in the practice of his profession. The condition of the bone transplantation in September, 1923, is shown in Figure 3.

Fig. 3.—X-ray photograph of the tumor transplant in Case 6, approximately eight months after transplantation. At this time the patient writes that the function of the arm is good.

Case 6.—E. D. was admitted to Washington University Dispensary February 19, 1919, complaining of pain and swelling in the right knee. Pain was first noted in April, 1918, and swelling began in August, 1918. The swelling and pain have been progressively worse until the present time. X-ray examination of the knee February 2, 1919, showed an area of bone destruction in the anterior aspect of the head of the tibia, and exploration was advised. This was refused and the patient was not seen again until September, 1919, at which time there had been a progressive increase in the swelling and x-ray examination showed an increase in the amount of bone destruction (Figure 4). Operation was advised.

At operation September 22, 1919, the upper end of the tibia was found to be occupied by a large firm nodular tumor which projected into the popliteal space almost surrounding the popliteal vessels and nerve. In order to free the vessels and nerve the tumor was opened and it was noted to be composed of a gelatinous translucent material. The defect in the tibia was bridged by turning down a flap of bone from the femur (Figure 5). The gross appearance of the tumor is illustrated in Figure 6. Microscopical examination of the tumor showed it to be a myxosarcoma. There were in the tumor, areas in which the tissues resembled cartilage. Convalescence was uneventful. Examination, however, in July, 1920, showed definite recurrence in the popliteal space. The bone transplant had healed, giving the patient a good weight-bearing leg. The recurrence of the tumor in the popliteal space was taken as an indication for amputation. Amputation of the distal third of the thigh was done on July 26, 1920. The recurrent tumor tissue was found on microscopical examination to be the same as the primary tumor. A report from this patient in November, 1923, four years after the first operation, states that she is well with no evidence of recurrence.

Case 7.—L. C., a white man, age 23, was admitted to the Jewish Hospital April 15, 1921. Seven years previously he received a bullet wound in the left leg half way between the knee and ankle. An attempt was made to remove the bullet by operation. Five years previously he developed syphilis and was treated with arsphenamin. Except for the period of the bullet wound the left leg had given no symptoms until ten months previously when a constant dull pain developed. Eight months before entrance to the hospital a lump just below the knee was noticed, which had gradually increased in size. Examination showed a visible enlargement of the upper third of the left tibia. The swelling was tender on deep pressure. The Wassermann was negative. There was no fever and no leukocytosis. X-ray examination showed enlargement and cavity formation in the proximal end of the shaft of the tibia (Figure 7). The increased density of the bone with the cavity formation and the history of the previous wound which left a foreign body in the tissues, led to the probable diagnosis of osteomyelitis and exploration was advised.

Operation.—April 19, 1921, incision through the skin revealed a reddish brown, friable mass apparently protruding through a hole in the bone and periosteum on the anteromedial surface of the upper third of the tibia. The tumor mass with the surrounding bone was removed, and the cavity thoroughly cauterized with pure

Fig. 4.—X-ray photograph in Case 7, September, 1919, showing increased bone destruction. Compare with Fig. 23.

carbolic acid followed by alcohol, after which the wound was closed without drainage. The post-operative course was uneventful. Microscopic examination of the tumor showed it to be a spindle cell sarcoma. September 23, 1921, the patient returned for examination stating that approximately three weeks before the leg had begun to swell at the site of the operation and it was incised by a physician. The wound had not healed. On examination there was a definite local recurrence of the tumor which formed an ulcerating fungus mass and protruded through the incision made three weeks before. X-ray and radium treatment were begun with an immediate cessation of pain and beginning decrease in the size of the tumor.

December 2, 1921, all local evidences of the tumor had disappeared.

December 27, 1921, there was recurrence of pain and on examination definite local recurrence of the tumor was found. X-ray treatment was given again, but the tumor continued to grow.

February 6, 1922, the continued growth of the tumor in spite of active x-ray and radium treatment together with the fact that the patient was having severe pain led us to advise amputation. A mid-thigh amputation was performed on February 7, 1922. Post-operative convalescence was uneventful.

In March, 1924, examination showed no evidence of local or metastatic recurrence of the tumor. The inguinal lymph nodes which were enlarged at the time of amputation had returned to normal size.

Case 8.—R. A., a white woman, age 30, was admitted to Barnes Hospital December 17, 1923. She was a trained nurse by profession who had a sister with tuberculosis of the ankle who had been at frequent intervals cared for by the patient. The patient stated that she first noticed pain in the right ankle approximately five years before. The pain had been present intermittently since the onset. For the previous two weeks the pain had been quite severe, although she had never been unable to walk.

Examination.—There were no external manifestations of disease except tenderness over the internal malleolus. X-ray examination showed sharply defined areas of bone destruction in the medial malleolus of the right ankle. The area of destruction involved both the epiphyses and diaphysis. There was no evidence of tuberculosis elsewhere in the body. The Wassermann was negative. The pre-operative diagnosis lay between bone tumor and tuberculosis, and exploration was advised.

Operation.—December 18, 1923, incison through the skin revealed the periosteum of the internal malleolus to be normal. On elevation of the periosteum and breaking through of the thin bone shell there was found a cavity in the cancellous bone containing a soft, yellowish, translucent, lobulated tumor. This was carefully removed leaving the cavity in the bone lined by a thin fibrous tissue lining. This was removed together with the slightly eburnated bone forming the wall of the cavity. The cavity was then thoroughly cauterized with tincture of iodin and the wound closed without drainage. Convalescence was uneventful. Cultures from the tumor were sterile. Guinea pig inoculation was negative. Microscopical examination of the tumor tissue showed it to be a mass of non-organized tissue containing a spindle and branched cells.

Cases 1 and 2 are characteristic examples of the course of the early metastasizing variety of bone sarcoma. All of these cases were dead before a period of two years had elapsed after the first symptom. In case 1, the most radical operation possible was carried out. In this case the common iliac artery was ligated before the operation and the amputation included the removal of all the tissues of the thigh up to the pelvic bone. A similar procedure was carried out in case 2. In neither of these cases was there any evidence of local recurrence, but both patients died approximately one and one-half years after the appearance of the first symptom: case 1, one year and three months after operation; and case 2, five months after operation. It would seem, therefore, that the radical removal of the primary tumor did not increase the length of life after the appearance of the initial symptoms.

Case 3, is interesting because of the fact that x-ray treatment was followed by a complete disappearance of the primary tumor and a remarkable healing of the bone destructive process. There was subsequently a local recurrence of the tumor in the soft parts which did not disappear with x-ray treatment. Radical amputation was performed and the total duration of the

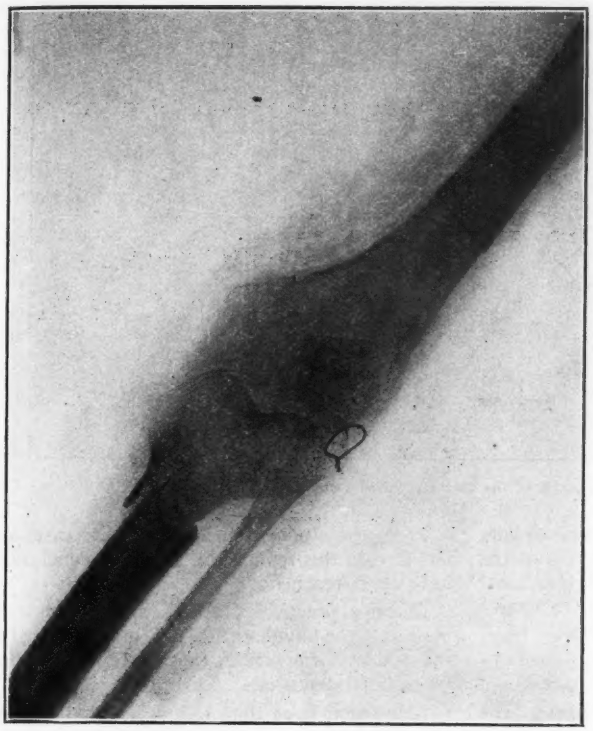

Fig. 5.—X-ray photograph Case 7, showing the extent of resection of the tibia for the local removal of the tumor and the method of repair of the bone defect.

disease after the first symptoms was one year and three months. In another instance in a patient with a periosteal sarcoma proven by exploration and removal of tissue, the tumor disappeared with x-ray treatment and the patient has remained apparently well for two years. X-ray treatment has seemed to be superior to radium treatment. It is administered without any hope of cure of the disease. If it does not alleviate pain or prevent pathological fracture, subsequent amputation may be performed to make the patient more comfortable. In cases 1, 2 and 3 the history, x-ray findings and microscopical examination of tissues removed indicated that the tumors were of the metastasizing variety and in no case was the radical operation undertaken with any hope of cure of the disease. The amputations in cases 1, 2 and 3 were done solely for the relief of pain or the getting rid of a flail leg to make the patient more comfortable.

Case 4 is reported in order to emphasize the point that it is unwise to assume from a clinical history and x-ray findings that a bone tumor is of the malignant variety and proceed immediately with radical treatment. It is my belief that, had we explored this tumor and removed a piece for diagnosis we could have saved at least enough of the forearm and hand to be of considerable use to the patient without influencing the ultimate prognosis of the disease. At least this method of procedure could have been given a trial. It is true the tumor had extended into the soft parts of the muscles, tendons, vessels, and nerves so that it might have been impossible to extirpate the tumor completely and save a useful extremity. But the amputation could have been performed after a trial had been made without subjecting the patient to the danger of tumor metastasis.

The probability of the validity of the conclusions reached as regards case 4, is indicated by the sequence of events in case 5. The tumor was a giant cell sarcoma which was submitted to two operations before complete local removal. The defect in the bone resulting from the removal of the tumor was subsequently filled by a bone transplant and the patient had a useful arm three years and five months after the appearance of the first symptoms of the disease.

In case 6 the patient did not submit herself to operative treatment until the tumor had spread locally into the soft parts involving vessels and nerves, the removal of which would have rendered the extremity distal to the tumor worse than useless had these structures been extirpated. An attempt was, therefore, made to remove the tumor locally and save the popliteal vessels and nerves. The large defect in the bone was bridged by a massive bone transplant which ultimately proved successful. The attempt at local excision was subsequently followed by local recurrence about the popliteal vessels and nerves. In order to extirpate the tumor completely an amputation was necessary. The patient is well five years and seven months after the first symptoms appeared and four years and two months after the first operation. This case illustrated again the fact that incomplete local extirpation

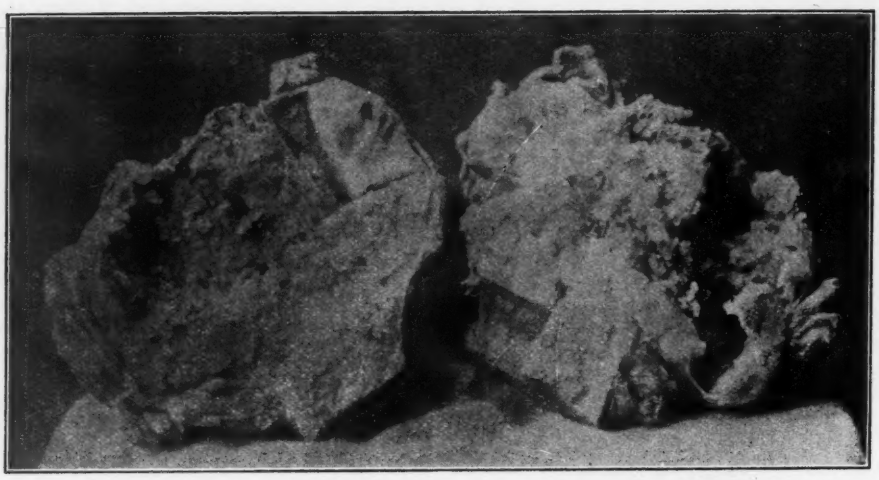

Fig. 6.—Photograph of the tumor removed from Case 7.

of the non-metastasizing variety of bone tumors does not influence the ultimate prognosis of the disease. It also shows that a good functional result can be obtained in the lower extremity after an extensive resection of the tibia.

Case 7 is interesting for several reasons. In the first place the clinical history and x-ray appearance were those of infectious disease. The microscopical examination of the tumor would indicate that it was one of the metastasizing variety. Local excision was followed by a recurrence which completely disappeared with x-ray and radium treatment. A second recurrence made amputation necessary. The patient is well four years after the first symptom and three years and four months after the first operation. I am inclined to believe that the patient might have been as effectively cured of his tumor by a local excision, but the ulcerating tumor made it apparently unwise to attempt the reconstruction of a useful leg by a complicated plastic operation.

Case 8 is reported as an illustration of the treatment which should be instituted in a bone tumor which is not clearly of the metastasizing variety. In this case the tumor was a myxoma. A local excision was performed which left the patient with a good immediate functional result. If the tumor recurs locally subsequent more radical local excision or amputation may be necessary in order to extirpate it completely. If the tumor is of the variety which produces metastases it is my belief that the ultimate prognosis is not changed by a radical amputation.

From the study of these and other cases not included in this report, the following conclusions have been reached:

(1) For practical purposes all sarcomata of bone may be divided into two groups. In one the tumor forms metastases and in the other no distant metastases occur.

(2) There is at the present time no hope of cure in the first group, while all cases of the second group are cured by any means which result in a local removal of the tumor tissue.

(3) The clinical differentiation of these two groups is difficult and often impossible.

(4) Bone tumors may be as effectively cured by complete local excision as by radical amputation.

(5) Exploratory incision for diagnosis or local operative removal does not influence the ultimate prognosis of the disease.

(6) Every means available including exploratory incision and removal of tissues for microscopical diagnosis should be instituted to determine if the bone tumor is of the metastasizing or non-metastasizing variety.

(7) In a given case, therefore, of sarcoma of bone local excision or amputation is to be chosen according to which gives the best immediate functional result.

435 University Club Building.

DISCUSSION (Abstract)

Dr. Isidore Cohn, New Orleans, La.—Dr. Brooks' re-

Fig. 7.—X-ray photograph Case 8, showing the appearance of the bone at the time the patient first applied for treatment. Note the foreign body "bullet," the increased density and cavity formation in the proximal third of the tibia. A diagnosis of probable osteomyelitis was made. At operation the condition was found to be sarcoma. Local excision was followed by recurrence, which disappeared with x-ray treatment, but subsequently recurred. Amputation. Patient well three years and five months after onset of disease, two years and nine months after resection.

sults are so admirable that most of us had better pattern after him and try to follow his procedure.

Dr. Russell H. Patterson, New York, N. Y.—In many cases of bone tumor the first symptom is pain without any external signs whatever. If an x-ray were taken early, at the first slight symptom of pain, the disease might be controlled better.

The second point Dr. Brooks mentioned was the lack of agreement among pathologists as to the diagnosis. That has also been our experience: that you can remove a certain kind of bone tumor and send a slide to one pathologist and then to another, and get two widely divergent opinions.

Another point about which I agree with Dr. Brooks is that given a tumor you do no harm by doing a biopsy, opening it and sending a section for examination.

X-ray and radium treatment, in our experience, have not been very successful.

We notice also that there are two types of individuals with these sarcomas: One type of sarcoma occurs in thin, undernourished people who have had a tumor for only a few months, but in whom the tumor is osteogenic. The second type occurs in well nourished individuals, is of longer duration, is apt to be slow growing and non-malignant.

Dr. John W. Neely, Terrel, Tex.—This is a radical departure from what has been taught us in the past. It is very encouraging to be assured by an authority that we can go into this bone and get a section of it, and get an opinion from a pathologist before we amputate.

Dr. Guy A. Caldwell, Shreveport, La.—We naturally expect x-ray studies of the lungs to tell us whether a tumor has metastasized or not. On a case some time ago of sarcoma of the femur, x-ray showed no metastases, but an autopsy a few days later showed several. The plates were studied alongside the specimen and the metastases still could not be seen.

Dr. E. D. Fenner, New Orleans, La.—Some years ago I saw in my clinic at the hospital a child of about 3½ years who presented a typical partial macrosomia, or congenital hypertrophy, of the left lower extremity, including the vulva on that side. About five years later she was brought back because of a tumor growth just above the ankle of the hypertrophied limb. The diagnosis of osteosarcoma was confirmed by microscopical examination. Being at that time far less convinced than I am at the present moment that cutting into a sarcoma for diagnosis does not increase the danger of metastasis, I performed an amputation through the femoral condyles. It was not possible to trace the case after she was discharged from the hospital.

Dr. Willis C. Campbell, Memphis, Tenn.—I want to say that I agree with all Dr. Brooks' conclusions regarding bone tumors. He showed one picture which was most interesting, a case in which he had removed the entire upper extremity of the humerus and transplanted the fibula. In that case, because of so much destruction, it was undoubtedly necessary, but the fact should be emphasized that in many of these cases the tumors may be excised from the ends of bones without

removing the entire bone. I have had a number in which I have cleaned out the cavity quite well, and which I have sewed up without injury to the bone. I sometimes put bone chips in the cavity. The bone fills up and there is no break in its continuity.

Dr. Brooks (closing).—The point which Dr. Campbell raised is a point which I particularly wanted made clear. It is my belief that the most conservative method which accomplishes a complete local extirpation of a bone tumor is the correct one.

Dr. Fenner has described a condition which reminds me of the condition found in the bones of patients affected by von Recklinghausen's neurofibromatosis. The fact that the patient subsequently died of a sarcoma is perfectly consistent with the existence of neurofibromatosis.

SEPARATE KIDNEY FUNCTION: COMPARATIVE VALUE OF DYE EXCRETION (PHENOLSULPHONEPHTHALEIN) AND SALT EXCRETION (SPECIFIC GRAVITY) AS TESTS OF DIFFERENTIAL KIDNEY FUNCTION*†

By L. C. Todd, M.D., *and* A. J. Crowell, M.D., Charlotte, N. C.

The test of kidney function in which phenolsulphonephthalein is the dye indicating the excretional activity of the kidneys has become widely popularized. It has established itself as a very valuable means of estimating certain of the renal activities because it seems evident that the excretion of this dye proceeds more or less parallel with the excretion of certain waste products. Impairment of the excretory function of the kidney may be reflected by the diminution in the dye output and the determination of this latter may give a fairly accurate quantitative estimate of the existing functional activity of the kidneys.

While the dye excretion is most commonly used as an estimate of total kidney function, in the field of urology it is constantly in use in making comparative tests on the two kidneys separated by uretheral catheterization, a differential test of kidney function. This is of value in determining which is the damaged kidney and to what extent it is damaged.

The measuring of the ability of the kidneys to excrete the various salts was perhaps the earliest of all functional kidney tests to be devised. The specific gravity of the urine is the measure of the total salt output and, by this simple determination under properly controlled conditions, we have another means of obtaining a quantitative estimate of the existing kidney function. It has been shown that the earliest evidence of kidney impairment is a diminution in ability to concentrate the salts for removal from the body. It seems that there is a definite attenuation of this function even before any departure from the normal is noted in the dye output or the chemistry of the blood.

It also has been definitely shown that the use of the specific gravity of the urine from either ureter may be a valuable means of estimating the separate kidney function and may be used as a differential test to determine which is the damaged kidney in unilateral disease and to what extent it may be functionally inferior to its fellow. In 1922, Fullerton[1] called attention to "unilateral diuresis" and he established the importance of diminished specific gravity of the urine from one side as a sign of unilateral kidney disease or a disturbance of the function of one of the kidneys. Shortly prior to this we had begun making a comparison of the dye test and the specific gravity test and their relative value in examination of clinical cases.

It is our object at this time to re-emphasize the value of the specific gravity of the urine as a differential renal function test and to compare it closely under parallel conditions with the more elaborate phenolsulphonephthalein excretion test.

TECHNIC OF METHODS
(SEPARATE RENAL FUNCTION DETERMINED BY DYE EXCRETION)

The technic of performing the differential 'phthalein excretion test at our clinic, which does not differ widely from the methods used in other places, is as follows:

With both catheters fitting snugly in the ureters, a glass of water (200 mils) is given the patient to drink to promote diuresis. Specimens of urine are collected from both kidneys, which specimens are used for microscopic, chemical and bacteriographical examination. At this time sufficient urine (3 mils) is collected from either side for the determination of specific gravity. Then an intravenous injection of 6 milligrams of the dye is given. Here the time is noted, and it is noted again as the dye first shows in the urine coming from either side which drops into sodium hydroxid solution in the collecting tubes.

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†From the Crowell Clinic of Urology and Dermatology, Charlotte, N. C.

†Read in Section on Urology, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

This is the appearance time and is recorded for the two separate sides. The excretion from either kidney is collected for a period of fifteen minutes following the appearance time. With these fifteen-minute specimens, the total fluid output, the total dye excretion and, by computing, the dye concentration is determined for the two kidneys separately. All of these determinations are of importance but we have come to regard the dye concentration as of most importance.

SEPARATE RENAL FUNCTION BY SPECIFIC GRAVITY DETERMINATIONS

The technic is simple. As soon as the ureteral catheters are in place and functioning properly, a specimen of urine can be collected from either side and the specific gravity determined on the separate samples. A comparison gives the desired information. Equal specific gravities indicate equally shared functional activity, while a disparity between the two gravities gives a rough quantitative estimate of the difference between the activities of the two kidneys, a lowered specific gravity indicating a lowered function. The question arises as to the amount of urine to collect. Very rarely is it not easily possible to collect as much as 3 mils from each kidney in 5 to 10 minutes time, and 3 mils is sufficient for the rapid determination by the Saxe urinopyknometer*, which is shown in Figure 2. This is accurate to the third decimal place. If only 1 mil can be collected, the gravity may be determined by actual weighing to the nearest milligram in a 1 mil Gay-Lussac specific gravity bottle on an accurate balance. We have used this method in a large number of cases with entire satisfaction. If only a drop or two of urine can be obtained, the gravity may be determined by suspending the drop in a mixture of chloroform and benzol and then with a regular urinometer taking the specific gravity of the mixture necessary to suspend the drop. These last two methods are accurate but slow. For practical purposes the urinopyknometer will be found preferable and for this 3 mils of the urine will be needed.

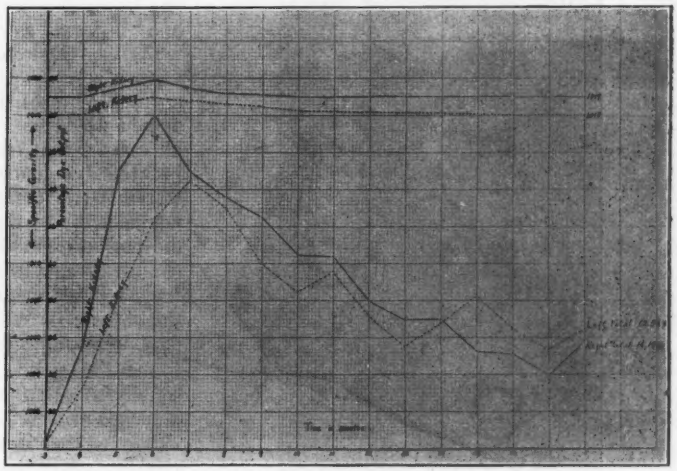

Fig. 1.—Curve of dye output of the separated kidneys by minute intervals in a normal case. The specific gravity of the minute specimens of urine from the separated kidneys is also charted.

DISCUSSION OF METHODS

The differential renal function test as indicated by the 'phthalein excretion gives us certain definite information. In unilateral disease it tells which is the damaged kidney and gives a fairly good quantitative idea of the extent of the functional impairment.

There are various disadvantages and sources of error. The time for collecting the specimens is long and is a severe trial to certain classes of patients. Frequently the catheters do not fit tightly and a considerable portion of the dye-containing urine finds its way into the bladder. For this latter reason we have come to regard the dye concentration as of greatest importance in getting a comparative idea of the functional activity of the two kidneys by the means of the 'phthalein test. The dye concentration per mil is computed by

*These inexpensive instruments may be obtained from almost any of the laboratory supply houses. The Will Corporation of Rochester, N. Y., has supplied us with quite satisfactory instruments of this type. It is essential to test out each urinopyknometer using distilled water within the bulb, as well as in the cylinder to float the instrument, when it should register 1,000 under the temperature conditions at which the instrument is marked as having been standardized. It is well also to test the specific gravity by this instrument of urine specimens or other solutions of known specific gravity to determine if the graduations on the stem are correct. We have found it simplifies filling the bulb to the mark to over-fill a trifle, then lower the level of the fluid exactly to the mark by touching the upper edge of the meniscus with absorbent cotton on an applicator. If the urine is at all cloudy, the specimen should be centrifuged to throw down any red blood cells, pus cells or epithelial cells.

Fig. 2.—The Saxe urino-pyknometer, about 5/6 natural size.

dividing the total percentage dye output from one kidney by the amount of urine collected from that kidney during the collection period.

The specific gravity of the urine from the separated kidneys gives as much information as that obtained by the dye test. It is simple to perform and the equipment inexpensive. Less time is consumed by the urologist and the period of the patient's pain or at least discomfort is materially shortened.

For practical purposes, we have come to regard a difference of two to three points between the gravities of the two urine specimens as of little importance, usually representing technical error. The same may be said in regard to a slight disparity in the total dye output and dye concentration from either side. A unilateral functional impairment should exhibit a definite discrepancy between the two sides.

COMPARISON OF THE TWO TESTS

We have used coincidently these two methods of determining separate kidney function in 131 cases. In all cases we have been able to collect the urine specimens for the specific gravity determinations just preceding the intravenous administration of the 'phthalein for the dye excretion test. We have had the opportunity of making the comparison between the two methods in renal tuberculosis, hypernephroma, renal and ureteral calculi, pyelitis, pyelonephritis, nephritis, hydronephrosis, nephroptosis and various other urological conditions as well as in a group of cases that were urologically negative and in which no other diagnosis was made. In all cases except four, the two tests ran parallel, i.e., the dye concentration and the salt concentration were increased or diminished to a similar degree. In these four cases the dye output did not correspond to the specific gravity or the clinical or operative findings; but, in all of the four, a large amount of dye had leaked around the catheter into the bladder, thus making this data impossible of interpretation.

The kidneys do not share the excretory duty equally at all times. There are periods of diminished or increased activity of one or the other kidney or even a portion of the kidney.[2] These changes might be further influenced by the trauma of ureteral catheterization.[3] While these facts must be considered in any short period functional test, it is very probable that whatever variation of activity there might be would be reflected similarly in the data obtained by either test.

We have yet to see a case in which the ultimate clinical or operative findings and the specific gravity test did not agree. We have had the opportunity of repeating the two tests upon a number of patients, upon two cases five times each, and the subsequent tests were in each case close corroborative checks on the original determinations. Apparently, our experience indicates that these intermittent periods of activity and rest of the various functioning unit groups do not markedly affect the sum total of accomplished excretion.

We have had the opportunity of watching the curve of excretory effort by minute intervals in both normal and pathologic conditions. Case No. 10,659 recorded in Figure 1 gives the

TABLE 1

Comparison of Separate Renal Function by the Two Tests in Average Typical Cases.

Case No.	Clinical Diagnosis	Ureteral Urine	Functional Test: Dye Excretion App. Time	Mils. Urine	Per Cent Dye	Dye Conc.	Salt Excretion S. G.
7641	Cystitis, Bilateral	R. Pus cells numerous	7	7	3	0.42	1.008
	Pyelitis	L. Pus cells numerous	7	6	2.5	0.42	1.008
8189	Pyohydronephrosis	R. No pus	10	3	6	2.00	1.034
	Lt.	L. Pus cells numerous	10	30	2	0.067	1.009
5031	Renal Calculi	R. Few pus cells and bac	3	9	10	1.10	1.022
	Rt.	L. No pus	3	4	9	2.25	1.033
8356	Ureteral Calculus	R. No pus	4	3.5	7	2.00	1.023
	Lt.	L. No pus	5	4	3.5	.87	1.017
9655	Renal Tuberculosis	R. Negative	5	2	3	1.50	1.024
	Lt.	L. Pus and bacilli extremely abundant	8	49	4	.08	1.002
9406	Hypernephroma	R. No pus	12	3	6	2.00	1.022
	Lt.	L. No pus	0	1.5	..	.. ....	1.006
9954	Abdominal Tumor	R. No pus	4	1.5	16	1.38	1.018
	Carcinoma of Liver	L. No pus	4	9	12	1.33	1.018
8792	Chronic Nephritis	R. Albumin, casts, pus and bacilli	10	18	*	.. ....	1.004
		L. Albumin, casts, pus and bacilli	15	5	*	.. ....	1.003
9966	Pyelitis	R. Few pus cells	4	15	8	0.53	1.017
	Bilateral	L. Pus abundant	4.5	45	8	0.17	1.002
12199	Hydronephrosis	R. Negative	3	11	18	1.73	1.027
	Lt.	L. Albumin, casts, old blood, few pus cells	9	15	2	0.14	1.003
12236	Pyelonephritis	R. Negative	3.5	7	18	2.50	1.024
	Lt.	L. Pus abundant, albumin heavy	5.5	7	10.5	1.50	1.009

*Trace.

curve of dye excretion by minutes of both kidneys in a normal case. The specific gravity was determined by the chloroform-benzol suspension method on each minute specimen. It is interesting to note that the specific gravity of all specimens, eighteen from each kidney, gave approximately the same specific gravity. The variation was within one degree (third decimal place); was highest at the greatest dye concentration and gradually became less as the dye concentration became less.

FINDINGS IN CLINICAL CASES

Table 1 shows in tabular form the findings in average typical cases of some of the various groups. We have the complete data in all of 131 cases.

Table 2 is a summary of all the cases in which we have had the opportunity of making the two tests coincidentally.

We have gathered from our complete data the changes noted by means of the two tests in the various types of disease examined and have arranged a brief summary of the findings in the average type case:

Urologically Negative.—The dye excretion and specific gravity are equal on both sides.

Calculus, Unilateral.—Few cases show no change. There may be considerable diminution dependent upon location of stone, size, presence of infection, etc. In early cases there is little or no change. With back pressure atrophy and infections, the gravity diminishes in proportion to renal damage.

Calculus, Bilateral.—Dye output and gravity were diminished more on the side more seriously affected.

Pyelitis.—In bilateral disease there is a low output and a low specific gravity. The kidney having the greatest damage will show a functional output proportionately lower than the other. With unilateral disease this reduction is more marked in the case of the injured kidney.

Cystitis.—Without an associated pyelitis both sides are normal and equal.

Nephritis.—This diffuse bilateral disease gives a reduction in both dye and salt output closely equal in degree.

Pyelonephritis.—Unilateral disease gives a marked reduction on the affected side by both tests.

Hydronephrosis.—Reduction in both dye and salt output is proportionate to the amount of dilatation and atrophy of the renal substance.

Renal Tuberculosis, Unilateral.—Impairment of functional capacity of the involved kidney is in proportion to the extent of the disease.

Hypernephroma.—A degree of lowered function as measured by both tests is dependent upon the extent of the growth, the replacement of kidney tissue, and the interference with urinary drainage.

Patients having pathology outside of the

TABLE 2

Table 2.—Summary of all Cases in which the Two Renal Function Tests were Done Together.

Diagnosis	No. Cases	Both Tests Parallel	Disagreement	No. of Cases Showing No Functional Change
Urologically Negative	31	30	1	28
Calculus, Unilateral	19	19	0	3
Calculus, Bilateral	5	4	1	0
Pyelitis, Unilateral	6	6	0	2
Pyelitis, Bilateral	8	8	0	2
Cystitis	10	10	0	8
Nephritis	7	7	0	0
Hydronephrosis	8	8	0	2
Pyelonephritis	6	6	0	0
Hematuria, Unilateral Cause Undetermined	5	4	1	1
Pyelitis of Pregnancy	2	2	0	2
Hypernephroma	3	3	0	0
Appendicitis	2	2	0	1
Cholelithiasis	2	2	0	2
Renal Tuberculosis	2	2	0	0
Nephroptosis	5	4	1	1
Miscellaneous	10	10	0	9
(No. of Cases)	131	127	4	61

urinary tract in which the kidneys are unaffected and in which cases the urologist is called in for diagnostic participation show a normal and equal functional capacity of both kidneys as measured by the 'phthalein excretion and the specific gravities of the separate urines.

It should be remembered that these functional tests measure only the function and do not necessarily indicate the extent of anatomic change in the renal architecture. Kidney function may also be partially inhibited by pathological conditions which are outside the kidney but which interfere with the circulation of the blood or the excretion of the urine. Early renal disease may show a temporary increase in functional activity.

CONCLUSIONS

(1) A comparison of the value of the phenolsulphonephthalein excretion and specific gravity as tests of separate kidney function is made by the coincident use of both in 131 clinical cases.

(2) The two tests, as indicators of functional activity, are seen to run closely parallel.

(3) A simple method of determining the specific gravity of small specimens (3 mils) is advocated as practical for this purpose.

(4) The simpler specific gravity test is preferable because it is less trying upon the patient, is time-saving to the urologist while at the same time it gives as much information as the other.

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DISCUSSION (Abstract)

Dr. A. Nelken, New Orleans, La.—The popularity of the phenolsulphonephthalein test can be explained largely by its simplicity. Dr. Todd has offered us a test which is even simpler than the routine 'phthalein test, and, therefore, if further experience bears out its value, its popularity is assured.

Unfortunately blood chemical examinations cannot be applied when we are trying to differentiate between the two kidneys. The 'phthalein test does this satisfactorily, but, as we all know, it is not infallible.

Many of us still remember Albarran's polyuria test as applied to differential kidney function. The Albarran test was founded upon the theory that the specific gravity of the diseased kidney was fixed, and that the healthy kidney would respond to the injection of a large quantity of fluid. Necessarily, therefore, the taking of fluid would cause a drop in the specific gravity of the urine from the healthy kidney unless the excretion of solid kept pace with the excretion of water. Now we know that increased output of fluid does not cause a perceptible variation in the output of 'phthalein. Dr. Todd's findings seem to contradict the Albarran test as it was applied twenty years ago,

Dr. Todd said that he found a diminution in the excretion of 'phthalein and a fall in specific gravity in cases of pyelitis. Theoretically pyelitis is not a disease of the functioning portion of the kidney. However, probably chronic uncomplicated pyelitis is not a clinical entity. Those cases are always pyelonephritis, or pyelonephrosis, and this will explain the difference in kidney function to which Dr. Todd has drawn attention.

Dr. Montague L. Boyd, Atlanta, Ga.—It is difficult to obtain the exact functional capacity of each kidney by a single 'phthalein test and ureteral catheterization. The thing which makes this difficulty is the necessity of recovering from the kidneys the total amount of urine secreted during the time the test is in progress. This is not accomplished if some of the urine is lost by leakage around the catheter, or if for some reason part of the urine is retained in the kidney, as might occur in a hydronephrosis, if there is an obstruction in the ureter or at the uretero-pelvic juncture, or an interference with the normal expulsive force of the kidney and ureter resulting from the catheterization.

If a catheter is introduced into the kidney so that the tip lies in the pelvis and the pelvis and calyces are irrigated most of the difficulties are overcome, but there is no assurance that there will not be a leakage about the catheter. A. R. Randall at the last meeting of the American Urological Association suggested a practice which I have employed for a good many years, namely: to block the leakage with a Garceau catheter on one side and collect urine from the other transvesically. This with irrigating through the catheter is satisfactory provided there is no retention of urine in the kidney, especially on the uncatheterized side, where the inability to irrigate would make an unrecognized retention more likely.

While these difficulties are not found in every case they are encountered sufficiently frequently to make a careful worker very reluctant to accept abnormal findings without doing a second or third test.

The test offered by Dr. Todd seems to overcome practically all of the difficulties encountered in the 'phthalein test and since it is necessary to obtain only a part of the urine, small catheters can be employed so that both ureters can be catheterized. It is often possible to pass a small catheter to the pelvis when a large one will not go.

If the specific gravity of the urine is not sufficiently affected by the presence of pus, blood, and mucus to interfere with its accurate estimation, and if his findings are corroborated by the work of other urologists, I believe that the test described will be generally adopted.

Dr. Todd (closing).—I am not familiar with the work on the Albarran test.

Dr. Nelken is correct in saying that cases that show a functional lowering are not cases of pyelitis alone. There is an associated pyelonephritis.

I want to emphasize the point Dr. Boyd brought out in regard to repetition of functional tests in any major work. We are all aware of the importance of repeating functional tests to check upon our previous findings, and I believe my paper, to a certain point, brought that out.

It has always been our policy to centrifugalize the specimen if it shows blood or pus in any great amount. That gives a clear supernatant urine with which the test can be made.

SURGERY OF THE LEFT COLON*

By FRED W. RANKIN, M.D.,
Lexington, Ky.

The left colon proper is that portion of the large bowel distal to the middle of the transverse segment, and it develops from that portion of the primitive intestinal tube known as the "hind gut." Its contents differ markedly from the right half, and its function and the operative mortality following its sacrifice differ likewise. Excepting congenital deformities, congenital bands, acute inflammatory lesions, and a few benign tumors which occasionally develop in this segment, the three conditions which demand surgical intervention most often are, in order of their frequency, cancer, diverticulitis, and chronic ulcerative colitis.

Chronic Ulcerative Colitis.—Chronic ulcerative colitis is a distinct pathological entity, characterized by an intractable bloody diarrhea, stools ranging from ten to twenty per day, rapid and progressive loss of weight and emaciation, and a tendency to remission of symptoms analogous to that of duodenal or gastric ulcer. Its pathology almost invariably begins in the lower sigmoid and rectum, and the lesions vary in the beginning from a hyperemic, friable, easily bleeding, diffusedly inflamed mucous membrane, to definite gray, pouched-out, ragged ulcerations, which involve the entire thickness of the bowel wall and progressively invade the whole colon from below upward. No definite organism causes all types of this disease, and numerous agents have been thought, at various times, to be the etiologic factor, without definite proof. The fact that it follows, in many cases, attacks of tropical dysentery, of the amebic types, has suggested the possible relationship. Bargen has recently reported some experimental work, tending to show that a specific streptococcus causes this disease. Its diagnosis is easily made by the clinical history, type and number of stools, and roentgenological characteristics, and its treatment, in the main, is unsatisfactory.

An ileostomy, after the method of John Young Brown, or Stone's modification of Brown's ileostomy, is the most popular and satisfactory method of approach. Mummery, however, disagrees with this, and believes that an appendicostomy is the method of choice. The ileostomy has the advantage of putting the entire colon at rest, or of providing a means of through and through irrigation as an avenue of medication. Certainly, the immediate results of an ileostomy are very satisfactory. The immediate results of an appendicostomy, according to Mummery, are also satisfying, and he argues that this operation be done even in the acute fulminating cases, where the prognosis is extremely grave. By side-tracking the colon, and permitting it to remain quiescent, the patient is relieved of the frequent stools immediately, and for two or three days there is usually a paresis of the bowel, and a consequent constipation. The difficult problem of when to close the ileostomy, if at all, is an important one. After all clinical symptoms have disappeared, and when proctoscopic and radiologic examination reveal no ulceration—and it is surprising to what an extent the mucous membrane of the colon repairs to apparently normal, without stricture—frequently the closure of an enterostomy may be undertaken. Frequently this fails, and is followed by a return of the diarrhea, with a resulting necessity of remaking an artificial anus. Unquestionably, many of these ileostomies must be tolerated permanently. The quality of the feces changes, there is no disagreeable odor to the content of the small bowel, and the right-

*Read in Section on Surgery, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

sided anus is comparatively easily cared for. Strauss, in a number of cases, has extirpated the colon following preliminary ileostomy, with satisfactory results.

Diverticulitis.—Diverticulitis within the past decade and a half, has been recognized as a definite clinical entity, possessing a characteristic syndrome of its own, and yet, frequently indistinguishable from cancer. Diverticula occur in all segments of the colon, but in the majority of instances are symptomless, except in the left colon. Judd, recently reporting a series of 615 cases of diverticulosis which were diagnosed by roentgenogram, found only 137 cases which required surgical intervention.

The etiology of this condition continues to be a moot question. The fact that it occurs mostly in middle life, would seem to negative evidences of its congenital nature. However, cases reported in young individuals are not unknown. Ashhurst has reported a case in a boy of seven, and Judd one in a boy of fifteen. Telling, in 1908, in studying the etiology of the condition, mentions the fact that it occurs in the ratio of two males to one female, and usually in obese patients who are suffering with constipation, producing increased internal pressure. He also lays stress on the relationship of diverticula to the points of entrance of the vessels into the gut wall; directing attention also to a congenital predisposition and muscular deficiency of the bowel wall.

Certain changes take place in the wall of the bowel, which under the influence of increased intracolonic pressure, secondary to constipation, produce the type of out-pouchings characteristic of this disease. All areas of the bowel wall are found sites of diverticula, although some observers have claimed a predilection along the mesenteric border close to the blood vessels. In the beginning, these diverticula are small and the sac contains the entire thickness of the bowel wall, but as time goes on, and inflammatory changes take place, plus the increase in intracolonic pressure, the musculature thins out and only the mucous membrane and serous coats remain undisturbed. The liquid content of the right colon, which does not make for irritation along the bowel lumen, militates against the diverticulitis becoming active in that segment. Hardened feces becoming caught in the sacs and producing irrigation, infection, and ulceration, account for the progressive changes found in the left half of the colon. The diverticula are rarely of much size, but stud the invaded bowel like a bunch of grapes. In the symptomless stage, their radiographic appearances are characteristic. Continued infection in the diverticula brings about a number of pathological changes. The inflammation may become acute and gangrenous, or perforating with local abscess formation, or diffuse peritonitis. The latter condition is extremely rare. A fistulous formation, with adjacent viscera, however is not uncommon. Sutton, in reporting 34 cases of vesico-enteric fistula, found six cases of fistula between the sigmoid and the bladder, due to diverticulitis. This is a process of direct extension with necrosis through the bladder wall, evidenced by a cystitis of high grade, and the passage of gas and fecal particles of foreign bodies, per urethra. I observed, and reported one case of vesico-sigmoidal fistula where the perforation took place in front of the triangular ligament, resulting in a huge emphysema of the scrotum. Colostomy relieved the condition, although the swelling was several weeks in disappearing.

The association of diverticulitis and malignancy has been called to attention frequently. The differentiation between the two is in many cases difficult, and occasionally impossible. In Judd's series, in which operation was performed, there was no evidence of carcinoma in 118 of the cases in the series, while in 19 there was an association of both malignancy and diverticulitis. Up to the present time, no direct demonstration of malignancy, developing as a result of diverticulitis, has been presented. The suggestion, however, holds good, as in case of malignancy of the stomach developing upon gastric ulcers.

Pain is a rather constant symptom in diverticulitis, whereas, in cancer, the opposite is true. Three out of four patients suffering from diverticulitis complain of pelvic pain. Constipation is present in the majority of cases, and the association of gas and abdominal distension is noted in a small percentage. Blood in the stool is a very rare accompaniment of this disease, being seen much less frequently than in malignancy. Jones emphatically states that if the roentgen evidences of diverticulitis are positive, and blood and pus appear in the stool, operation for cancer should be undertaken, with the likelihood that both conditions will be revealed.

Unquestionably, diverticulitis is more difficult of treatment from the standpoint of technic and immediate mortality, than malignancy. Although obstruction is rare, infection is always present and this factor renders a single stage resection hazardous, particularly if there are complicating fistulae. A preliminary colostomy, high in the

sigmoid, with a secondary resection and end-to-end anastomosis, offers the lowest mortality and best end results. Where abscess formation is present, one is compelled simply to drain the abscess. This entails a fecal fistula, usually of long duration. Where the opening between the bladder and sigmoid is producing the main syndrome of symptoms, division of the fistulous tract with closure of the bladder and sigmoid is accomplished not without difficulty. The technical difficulties and high operative mortality suggest that the ideal procedure in diverticulitis should be a graded one, identical with that undertaken for malignancy, but for different reasons. Here, infection is the gravest factor to be contended with, while in the malignant cases, obstruction offers the greatest difficulty.

Cancer.—The left colon, not including the rectum, is the site of cancer in a higher percentage of cases than the other segments. Statistics show that approximately 64+ per cent of colonic cancers appear in the pelvic colon, 7+ per cent in the descending colon, and 3+ per cent in the splenic flexure. The symptomology revolves around the syndrome of obstruction, either in its acute or chronic form. Chronic obstruction accounts for the symptoms in more than two-thirds of the cases, while about 5 per cent of all colonic cancers manifest themselves as acute intestinal obstruction. Coming on without preliminary warning, this small group of cases represents a most hazardous condition, since acute obstruction, due to malignancy occurs six times as frequently in the left colon as in the right side. Mortality in acute obstruction, due to malignancy, is exceptionally high, but seems to depend upon the type of operation employed, as well as the time the symptoms are recognized. Burgess' operative mortality was 29 per cent when colostomy and exploration was done. The primary resection was followed by a mortality of 85 per cent.

To institute some type of intestinal drainage under local anesthesia or local and gas, and wait for the acute symptoms to subside, is the method of choice. The ileostomy of Brown, or cecostomy after the Gibson or Witzel technic, done through a gridiron incision, under local anesthesia, and without exploration, offers the best outlook. At a subsequent stage, the location of the obstruction may be identified and its resection undertaken. In the more chronic type of left colonic cancer, even where the obstruction is of a mild grade, it is hazardous to attempt a primary resection without preliminary colonic drainage. Not only are the local conditions unfavorable for successful immediate anastomosis, but the devitalized individual possesses less resistance to undergo an extensive resection.

The relief of intracolonic pressure postoperatively, is the keynote of successful intestinal resection. A graded operation offers greater opportunity for more radical secondary resection and in addition, is carried out with a lower mortality in the left colon than in a single stage extirpation. Because of obstruction, lowered resistance, and the local conditions present at the growth, mortality in the left colon has consistently been higher than in its fellow of the right side. A mortality of 15 to 17 per cent, until recent years, has been considered average in dealing with the left colon, but the two stage resection has reduced this to the level of the right half, or 12 per cent. In a series of 33 cases of graded operation, which I reviewed from the Mayo Clinic, there were four deaths, an immediate mortality of 12+ per cent. This is almost identical with the end operative results of Jones, whose operative mortality is 13 per cent. This reduction of mortality, without limiting the operability, evidences the advantages of the two-stage operation. Cecostomy or colostomy may be employed as the preliminary step. Both have their advocates and advantages. Cecostomy removes the artificial anus further from the field of secondary operation. It is satisfactory for irrigation, and more easily closed than the colostomy. Our experience has been with the colostomy made through an ample incision through the left rectus muscle, which permits of a satisfactory exploration of the liver, local growth, and lymphatic glands. The modified Mixter technic is easily done and not difficult to take care of during the period between stages of operation, when irrigation should be instituted in both the distal and proximal limbs. Resection may be carried out in a more radical manner in the second stage. The growth should be approached mesial to the colostomy, since one will find a limitation of space if an attempt is made to approach it from the outside. Mobilization of the growth is easily accomplished by splitting the peritoneum on the outside and rolling the whole mass inward. Resection of the segment and its gland-bearing area, and end-to-end anastomosis without a tube, completes the operation. Two layers of suture usually are sufficient, the first layer taking in the mucous and submucous layers, and the second, the peritoneum. Having the colostomy or cecostomy above, there is small reason for failure of union. Closure of the artificial anus completes the operation.

Operations for the exteriorization of the left colonic growths popularized themselves because of their apparent easy accomplishment and lack of operative mortality. A statistical study of a large series of cases of the Mikulicz-Bruns type of operation, however, reveals a mortality of 9.5 per cent, without taking into consideration the abdominal recurrences which must follow any operation not providing for a gland dissection. Considering the lowered mortality in the graded operation in left colonic growths, I believe that the exteriorization procedure finds its highest field of usefulness in cancer as a palliative measure. On account of the great number of malignancies deemed inoperable because of their clinical symptoms, it seems wise that an exploration should be undertaken in the vast majority of these cases. Although accompanied by a higher mortality in this type of case, than a resection in a favorable group, occasionally one discovers a supposed inoperable case to be still local and operable. Certainly colostomy above the inoperable growth makes the remaining months of life much more tolerable and free from the pain and discomfort which is their lot.

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Discussion follows paper of Dr. Kerr, page 294.

RADICAL TREATMENT OF HIRSCHSPRUNG'S DISEASE

By HARRY H. KERR, M.D., C.M.,
Washington, D. C.

Megacolon, or Hirschsprung's disease, is a congenital hypertrophy and dilation of a segment of the alimentary canal. It has been reported as occurring in the esophagus, duodenum, small bowel, and in the vermiform appendix, or colon. By far the largest number of cases have occurred in the colon.

The first cases were reported by Parry, in 1825, and by Billard, in 1829. In 1886, however, Hirschsprung presented the first complete description of the condition before the Berlin Congress for Children's Diseases. Since then, upwards of 150 communications on the subject have appeared. Finney's masterly study, published in 1908, exhaustively summarized all of our knowledge on the subject up to that time, and has remained the most valuable contribution in modern literature.

The etiology will not be discussed here. Suffice it to say that authorities are pretty well agreed that the condition is a congenital one, with hypertrophy of all the coats of the bowel and enlargement of the bowel segment affected.

As to the diagnosis, though the earlier cases were discovered sometimes in adult patients and frequently as the result of obstipation or of obstruction, Hirschsprung's disease is often diagnosed in infants and children by the routine x-ray examination of the gastro-intestinal tract. It is frequently found before marked symptoms have developed, but in the children affected a characteristic picture is presented. The child is undernourished, is of anemic or pasty complexion, and presents on examination an enlarged and distended abdomen. The history elicits a story of constipation, sometimes of surprisingly long periods. The x-ray is the most valuable means of diagnosis. A bismuth meal will often demonstrate the condition, but the opaque enema is far more accurate and gives much more information. Under the roentgen ray, the affected loop of bowel is seen to be enlarged, dilated, and does not show the usual haustration. Unless the case is studied under the fluoroscope during the administration of the enema, it is difficult to map out accurately the affected portion. With the fluoroscope the range of motion and the possibility of resection of the diseased gut can often be determined.

A study of the literature proves the advantage of surgical treatment over any other method. The medical treatment should be confined to that necessary to prepare the patient for operation. When the child is a poor surgical risk, repeated daily enemas, the administration of mineral oil, and tonic and dietary measures will be of material benefit in putting him in such condition that surgery can be carried out with minimum risk.

Surgically, Hirschsprung's disease may be corrected by a plastic operation, short circuiting procedures, or resection of the diseased bowel.

The plication of a short section of affected intestinal canal may be sufficient, though in most cases it has proved inadequate. Isolation of the

*Read in Section on Surgery, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

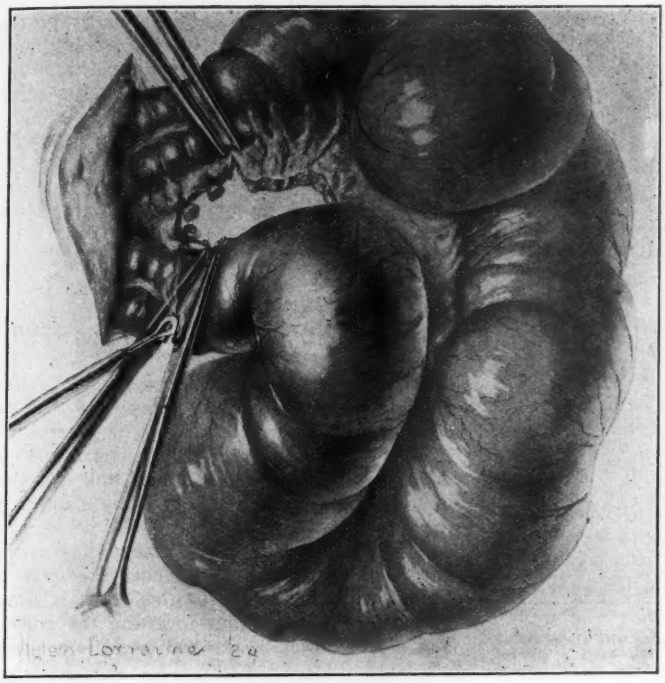

Fig. 1.—The diseased gut delivered from the abdomen and the pairs of crushing clamps applied in position, healthy bowel above and below the lesion. Division of the bowel with the cautery between each pair of clamps.

affected loop by a short circuiting anastomosis is unsurgical and should be condemned except as a first stage maneuver preliminary to a later resection.

All modern authorities agree that the ideal and best possible treatment is the removal of the diseased bowel. This may be carried out as a one stage or a two stage procedure. Resection of the colon is considered a safer operation with a lower mortality when it is performed in two stages. A preliminary cecostomy drains the canal proximal to the diseased loop, and, what is possibly far more important, acts as a safety valve when resection is carried out. When obstruction is present, this is undoubtedly the method of choice, and a preliminary colostomy or cecostomy should be performed. As Rankin, in speaking of the choice of operations in cancer of the colon, says:

"Dehydration, intoxication, and anemia play a large part in operative mortality, but I believe obstruction, if present even in a small degree, influences mortality more than any one factor."

In Hirschsprung's disease, however, obstruction is less often met with, and though severe obstipation presents itself it can usually be overcome by colonic irrigations and by medical treatment as outlined.

In the unobstructed case of Hirschsprung's disease that has been properly prepared for operation, primary resection is the operation of choice. This is contrary to the usual dictum, but I have no hesitation in advising it when it is carried out with the basting stitch technic. With the older types of resection, where the bowel lumen is opened and the peritoneum exposed to the highly infective contents, it is found that infection, leakage, and peritonitis are too prone to occur. Here the preliminary cecostomy, which empties the bowel contents before they reach the region of resection, decidedly lowers the chances of complications. The distention at the site of anastomosis by bowel contents or gases will precipitate a leak, unless an anastomosis has been perfectly performed and unless there is no inflammatory reaction in its neighborhood. The cecostomy, allowing the escape of the bowel contents, will save the line of anastomosis from the strain brought on it by peristalsis from above. No wonder then that the two stage operation has proved its value in colon resections.

When I advise a one stage operation I realize that the reasons for so doing must be of the best. As most of these procedures will be carried out in children, the general advantage of a single operation over two operations is admitted. The child is apt to have an unreasoning fear of a second operation after one experience, and this emotional condition should be avoided if possible. If an anastomosis can be performed by an aseptic technic, so that soiling of the peritoneum is eliminated, the chances of complications are materially reduced. If, in addition, the possibility of leakage at the suture line is also eliminated, primary union with a smooth

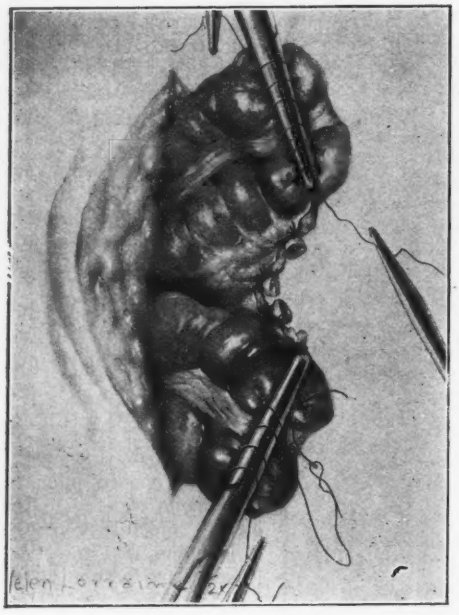

Fig. 2.—The healthy bowel ends sealed with the crushing clamps. The application of the basting stitches over each clamp.

convalescence is assured. If the only reason for a preliminary cecostomy is that it is a safeguard for an imperfect suture of bowel ends, then one is justified in eliminating it where a safe and perfect anastomosis can be performed.

The Basting Stitch Technic.—An ideal anastomosis requires end to end suture of normal intestines. The entire circumference of the bowel should be peritonized at the line of suture. There must be no narrowing of the lumen, though the intestinal walls must be somewhat inverted. The anastomosing suture itself should be a continuous circular stitch, so that the distention to which the stoma is subjected will tend to stretch the suture and automatically tighten the anastomosis. By observing these fundamental principles of peritonization and circular suture, so that soiling and leakage are impossible, primary resection may be performed without chance of complications.

In a case of Hirschsprung's disease where the barium enema has demonstrated the extent of the pathology and where the possibility of resection with end to end suture has been demonstrated by the same means, primary resection should be performed. When the child has been properly prepared by repeated enemas, a right or left rectus incision is made under general anesthesia. The infected loop of intestine is delivered from the abdomen, and a pair of crushing clamps is applied in close apposition across the normal intestine above and below the lesion. The gut is divided with the cautery between each pair of opposed clamps. The diseased bowel may then be removed by sectioning its mesentery, being careful to maintain the circulation of the proximal and distal loops.

We now have the two ends of normal bowel closed by crushing clamps applied to the lumen. The basting stitch is next applied. This is a continuous right angled Cushing stitch, with the loops between the stitches passing over the clamp. The first stitch and the last are applied on the free and the mesenteric border, and are parallel to the bowel axis. The intervening stitches are at right angles to the bowel axis and are inserted in turn, first in one wall and then in the opposite wall. The crushing clamp plus the cauterization will control all hemorrhage from the divided gut. The clamp is now loosened and withdrawn from under the loops of the basting stitch. The basting stitch is immediately drawn taut, thus inverting the crushed end of the bowel. Each end presents a closed,

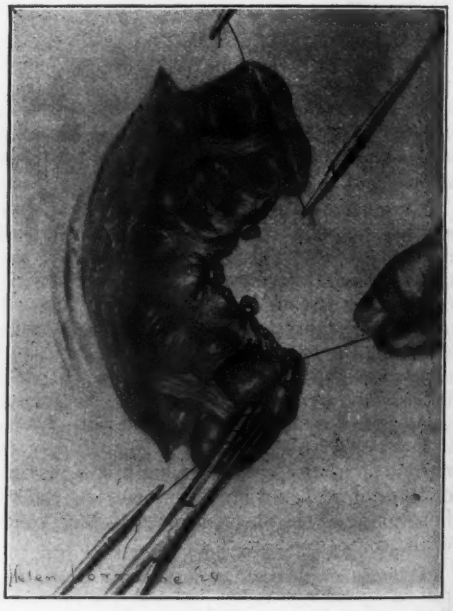

Fig. 3.—The clamp withdrawn from under the loops of the basting stitch, the basting stitch drawn taut, inverting the crushed ends of the bowel and completely peritonealizing the inverted gut.

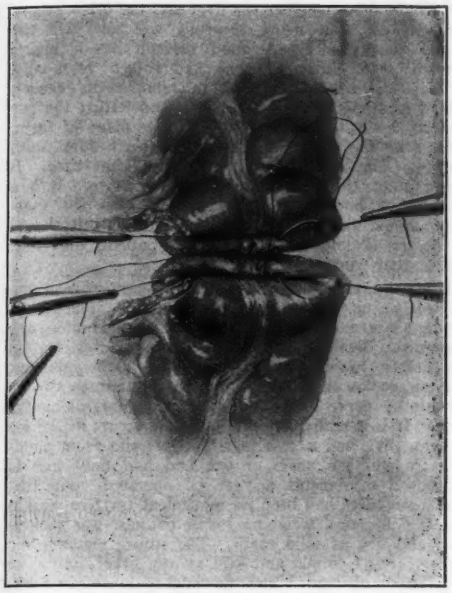

Fig. 4.—The two inverted ends, suspended on their basting thread, are held together, the single continuous anastomosing suture is begun.

inverted lumen with complete peritonization of its circumference.

With the proximal and distal loops treated in this manner, the anastomosing suture can be applied. The two ends are swung on their respective basting stitches and placed side by side. There are no clamps or mechanical devices on the bowel. It can be easily handled and turned or twisted in any way for the convenience of the operator. The anastomosing suture should be a continuous cat-gut suture with each stitch anchored well into the fibrous coat of the intestine. When the anastomosis has been completed, the basting stitches are cut and withdrawn from each end. The bowel wall above and below the suture should now be inverted through the stoma to break up the agglutination of the two ends from the crushing clamps and cauterization. This completes the anastomosis. The mesenteric defect should be sutured and the bowel returned into the abdominal cavity. The abdomen is closed in the usual way without drainage.

It is well to prescribe mineral oil following such operations, and to withhold administration of enemas for at least a week. Daily bowel movements will be established within a short time. In fact, following extensive resections the bowels may move more than once in the twenty-four hours. The obstipation and resulting intoxication are thus corrected, and a radical cure is effected.

Case I.—Miss V. C., white, age 46, was brought into Providence Hospital suffering from intestinal obstruction. She was acutely ill, with excessive abdominal distension, vomiting and she had not had a movement of the bowels in seven days. Immediate operation disclosed an abdominal cavity filled with a hugely distended colon containing large fecal concretions. A side to side anastomosis between the terminal ileum and the lower sigmoid was made and the abdomen closed. Convalescence was uneventful.

About two weeks later the bowel having been emptied by repeated enemas, she was again operated upon. The entire colon was removed leaving the original anastomosis between the ileum and the lower sigmoid including the end of the ileum and sigmoid. She recovered from this operation with very little reaction though she had frequent watery stools for a long time. She subsequently died from an unknown cause, but had developed no further abdominal symptoms.

Case II.—H. S., white, age 6, was admitted to Children's Hospital for obstinate constipation and enlarged abdomen. A diagnosis of Hirschsprung's disease was made following x-ray study. Rectal examination disclosed a markedly hypertrophied and over-lapping rectal valve. Thinking that this might be a factor in this condition a valvotomy was performed in February, 1917. The results, as far as the correction of the condition was concerned, were negative and in June the abdomen was opened and a side to side anastomosis between the normal transverse colon and the lower sigmoid was done, using the basting stitch technic.

Two weeks later the diseased gut, consisting of the distal, transverse and descending colon and sigmoid were excised. There was a satisfactory convalescence from the operation.

A follow-up letter brings information that the child died in 1920 from some unrelated condition.

Case III.—E. L., age 8, was admitted August 9,

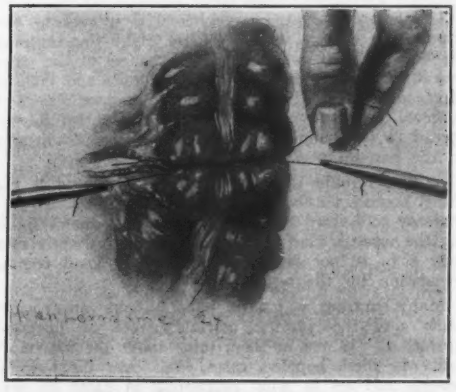

Fig. 5.—The anastomosis being completed with a single continuous circular suture, the basting stitches are withdrawn, thus completing an aseptic resection.

1923, with a large mass in the abdomen. Examination disclosed a full abdomen with a large, soft movable mass, evidently impacted feces. Repeated enemas brought voluminous returns and a subsequent x-ray study proved the diagnosis to be Hirschsprung's disease involving the upper sigmoid flexure. She was sent home under medical treatment for a couple of months and then reported to the hospital. She was operated upon and the diseased bowel resected by the basting stitch technic. End to end anastomosis between the descending colon and sigmoid was performed. Convalescence was satisfactory.

When seen this month the patient had gained considerably in weight, and has three normal stools a day. She is perfectly well and very much improved in appearance and in her aptitude in school since operation.

Case IV.—D. S., white, age 4, was seen in consultation for loss of weight, anemia and constipation. X-ray study confirmed the diagnosis of Hirschsprung's disease involving probably the descending colon and sigmoid. After two weeks of medical treatment she was operated upon and the markedly distended, enlarged and thickened sigmoid flexure was resected by an end to end anastomosis between the descending colon and the lower sigmoid by the basting stitch technic. She made a satisfactory convalescence. When seen recently she had gained in weight and her bowels moved without enema.

DISCUSSION (Abstract)

Papers of Dr. Rankin and Dr. Kerr.

Dr. Charles H. Mayo, Rochester, Minn.—There are relatively few serious operations on the small intestines in comparison with those on the large bowel. Nature did not connect the colon up so closely with the lymphatic system. There are so few glands that the best Berkefeld filter does not compare with the membrane that surrounds the large bowel, whereas the small bowel does all of its absorbing through the lymphatic system. Nature drinks back the fluids into the large right bowel and holds back cancer cells and other infection, so that while one would think the liver would soon become involved, it is invaded very late in cancer of the right colon. Here it is rare to have symptoms of metastasis before a year, or even at times eighteen months.

The left side of the large bowel is subject to the traumatism of dry feces. On the right the contents are liquid, and if you must have a cancer of the large bowel, have it on the right side. Months and months after someone has said, "Here is a cancer," a good surgeon can go in and remove the tumor, for it will spread to the lymphatics until it has become adherent to the parietal peritoneum.

As Dr. Rankin said, the two-step operation is the thing, because tension is an obstacle to success. A preliminary colostomy lessens the chance of tension's spoiling the result. The mortality with late cancer is thus only 8 to 10 per cent, which is a very good recommendation for the method.

Many surgeons will write papers about cancer mortality and the varying mortality rate of different operations. If one of them talks about the low mortality in these hopeless cases, look over his hospital reports and see in what proportion of cases he performs a colostomy only. He will let many people go on to their deaths when a little more operative procedure might have saved their lives. A little further exploration would show whether the liver and the other organs were invaded, but many surgeons will not give the patient that chance. A good surgeon has a higher mortality rate today than he had fifteen years ago. He has learned that if he can remove the cancer, instead of stopping at a colostomy, and letting the patient go slowly to his death, he can save many of them, even if he has a higher mortality in such sure death diseases. The high mortality is there all the time. It is just a question of whom you charge it to. It is a question of bookkeeping. Many men say the mortality should be from 3 to 5 per cent, but it should be higher if you have given the patient the same chance that you would want.

The condition of megacolon has recently been explained to us by Royle's work on the sympathetic nervous system. Through the work of Hunter, the anatomist, Decriere, has shown that severing certain sympathetic nerves produces paralysis of the intestine, and megacolon has been produced experimentally in animals by nerve section at the right points along the spine. It is a real paralysis, just as it occurs in the leg or arm. We had a case in a patient who from childhood to eighteen years of age had had only five to ten bowel movements a year. I operated upon that case when there had been no movement for five months and the material, weighing many pounds, was just as hard and dry as solid earth. The suture methods described are as simple and safe as any other suture we now know of, and I can thoroughly recommend the procedures brought forth in both papers by the authors.

Dr. Ellis Fischel, St. Louis, Mo.—I am not willing to give up the Mikulicz type of operation for cancer, particularly in the left side of the colon. I much prefer the end-to-end anastomosis, but in the ordinary case as we see it I believe the Mikulicz type of operation is the best. Dr. Rankin is right that we cannot take much tissue, but as Dr. Mayo brought out, the extension beyond the gut is not common and one can bring up the pericolonic tissue with the large bowel. For that reason the primary operative mortality is less, and in the belief that we will cure approximately as many cases as by any type of resection I shall not give up the Mikulicz operation.

Dr. Kerr's paper covered the subject in a new way for me. Where one can get the patients and prepare them in the right technic, the one step end-to-end, especially in children, is the best method.

I wish to present an operation which may add some light to the etiology of Hirschsprung's disease. This was a one stage emergency operation on a colored man, 52 years old, who had been obstructed for a week. There was no history of previous obstruction or of anemia. He was distended, ballooned, the pulse was 72, and respirations were increased, but he was not toxic and we worked over him for eighteen hours in an effort to get something out of his colon. A sigmoidoscopic examination showed nothing. We suspected a low lying carcinoma and we made an exploratory operation. Once having delivered a coil of the gut we got the sigmoid out and could not replace it, but found the distended gut. Upon palpating the abdomen we could find nothing but hypertrophy. This, I think, is contrary to the theory of origin from the sympathetic nerve, for this gut was so hypertrophic that we could not get it back. We did not wish to do an operation on the man, who had been obstructed for seven days,

and remove his whole colon, but this was all we could do. The rectum was very broad at the terminal sigmoid. The patient had a stormy time but recovered. I saw him fifteen months later but he would not permit any examination of the rectum, even a digital one.

I looked up the subject very thoroughly and none of the eleven etiological reasons seemed to suit the case. It was evidently a congenital hypertrophy, going on to the fifty-second year with more and more obstruction all the time and increase in weight until it caused the pronounced obstruction for which the patient sought relief.

Dr. Rankin (closing).—I cannot agree as to the efficacy of the Mikulicz operation, from the standpoint of either mortality or in results. I have gone over a large series of this type of procedure, and the immediate mortality is 9.5 per cent. The recurrences in the abdominal wall were 7 per cent. There is no reason to believe that the intra-abdominal recurrences are not higher than in operations which are more radical and remove adjacent tissues and lymphatics. The Mikulicz procedure is a simple excision of the local growth.

In the treatment of Hirschsprung's disease, I think Dr. Kerr has shown conclusively that the one stage operation, using his technic, is the operation of choice. The usual surgical mortality in this type of case is about 40 per cent, and I believe his excellent results show the advisability of an aseptic method of removal. I have used his technic in resection of the right colon a number of times, and believe it, by all odds, the operation of choice. It does away with chances of peritonitis from contamination and lessens liability to leakage. Also, it can be modified to conform to almost any condition met with.

Dr. Kerr (closing).—I have nothing to add except to stress some details of the technic. Before division the bowel is crushed with a powerful clamp. No special clamp is necessary and we usually use a Kelly curved hemostat. The bowel is divided with the cautery. The combination of the crushing and the cauterization absolutely controls hemorrhage from the divided ends. When the anastomosis is performed, the crushed edge is invaginated into the lumen, thus bringing into approximation the peritoneum throughout the circumference of the bowel.

When the anastomosis is completed it is necessary to break up a possible agglutination that has been caused by the crushing and cauterization. This is performed by forcing the neighboring wall of the bowel through the stoma as in the illustration.

CANCER OF THE RECTUM*

By JOHN L. JELKS, M.D., F.A.C.S.,
Memphis, Tenn.

A great educational campaign has been on throughout this country for several years and the laymen have been educated and aroused to the importance of early recognition of cancer, and pre-cancerous conditions. The fact remains that the cancer incidence is ever increasing. Late and hopeless cases of intestinal cancer presenting themselves or being referred to the surgeon by the family doctor continue about the same in ratio as in former years.

Rectal cancer is seldom seen or felt in its early stage and unless it is associated with some other condition, that provokes symptoms which demand examination, modesty often times deters the patients from presenting themselves for examination. Oftentimes doctors have false ideas of the "false modesty" of their patients and do not suggest doing that for which the patient applies, namely: making a thorough examination, which, in the cancer age must include a careful high digital examination of the rectum. Hence, when subjective and objective symptoms are provocative of insistence upon the patient's part, an early cancer in the period of abeyance no longer exists.

My attention on several occasions has been called to the treatments by general practitioners and gastro-enterologists for an achylia gastrica, in which cases, thorough examinations, including x-ray and gastro-intestinal series were said to have been made. Yet a few simple facts were overlooked. The patients were in the cancer age. They were in most instances losing weight and strength. By close questioning it was noted they were more constipated as a rule or a little mucous diarrhea had supervened after a period in which constipation had been complained of. They might not have noticed a more muddy or toxic complexion and members of their family have been important witnesses to be questioned. Finally, no digital examination had been made, or if so, a mass was taken to be either a prostate, a cervix uteri, or a small fibroid. Or the digital examination was not such as I am in the habit of making, which is as follows:

The patient is placed first in the lateral position with thighs flexed on abdomen and legs on thighs. The well anointed gloved finger is inserted as high as possible while the patient bears down. The contents of the pelvis thus come within touch. Then the patient stands in a moderately stooped position while the same procedure is gone through, and the sense of touch is drawn upon as the finger sweeps the gut circumference, and then by the latter's mobility, the pelvic cavity content, including the sigmoid flexure, is palpated.

I have thus, in academic manner of description, given a method, which the thousands of physicians who read the journal may not take

*Read in Section on Gastro-Enterology, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

Fig. 1.—Ileo-colostomy for proximal drainage adenomatosis with obstruction.

the pains to practice. Seventy-five per cent of cases of cancer of the rectum referred with a diagnosis, are either hopelessly inoperable or the operation becomes a late one. I emphasize this point and commend our English physicians for earlier diagnoses than our physicians.

It is not my purpose to enter into a discussion of the classification of cancer. This, and bibliography, are text book business, though there are cases which may occur and have occurred in my work which require reference to forms of cancer, and cases which, though not cancer, yet, are equally fatal if not properly dealt with, and others which are pro- or pre-cancerous.

In the course of a long continued chronic proctocolitis, especially of the chronic ulcerative type, there often occur single or multiple adenomata. Many of these may be polypoid and a diagnosis of polyposis is made, which conveys at once the idea of innocence. Some of these tumors may be sessile also but it is stated, "they simply have not advanced to the polypoid stage." One or a dozen of these are removed and submitted to the pathologist, who reports that the clinical findings are correct; namely, "multiple adenomatosis or polyposis." The gut continues to fill with these tumors, which eventually produce a greater or less degree of obstruction, hemorrhage, diarrhea and other later symptoms. These tumors are the irritative result of glandular hyperplasia. Some of these cases are tuberculous, yet, they are just as sure to destroy the patient's life; therefore, should be classed as malignant tuberculous adenomatosis. A case of this character is here presented (Fig. 1):

The rectum and the sigmoid were completely degenerated into a soft friable mass. This condition resulted from a primary chronic amebic ulceration of the colon, and produced obstructions, which necessitated ileocecostomy, thus eliminating the colon and allowing proximal drainage. Following this operation the patient gained in health, strength and weight. Later when I removed the rectum and sigmoid, the secondary true condition of tuberculosis was found.

Recto-colonic adenomatosis and polyposis have always been considered benign. One, twenty or a hundred of these tumors may not be malignant, yet, one tumor not larger than a grain of corn may already be malignant (Fig. 2). The point I wish to emphasize is, these cases are potentially cancerous and should be thus classified. In this opinion, which I have held for many years, Mr. Mummery concurs. These conditions are often encountered in the comparatively young subjects. I have seen several cases at ages ranging from 20 to 35 years, and I believe no greater number above thirty-five,

Fig. 2.—Multiple adenomatosis and polyposis involving rectum and colon

though some have been much older. I have not kept an accurate account of my cases, but I am sure I have seen quite twenty-five. They often metastasize in the lungs and mediastinum, as you will note from illustrations (Fig. 3).

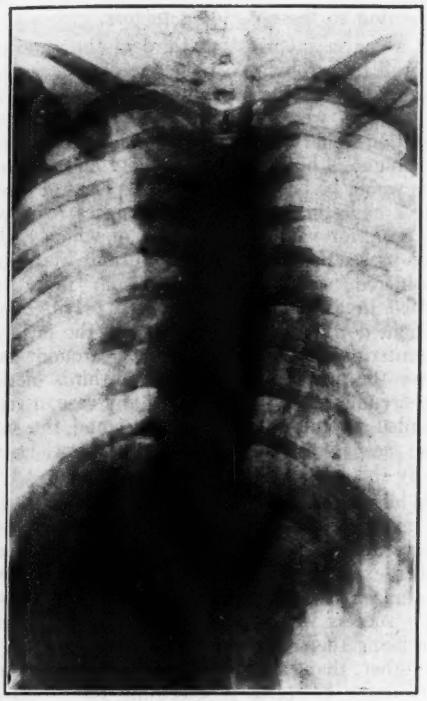

Fig. 3.—Metastasis in lung mediastinum secondary to primary adenomatosis and polyposis involving rectum and colon, all of which are secondary to amebic ulcerations of rectum and colon.

There are other classes of cases to which I would call your attention which are occasionally found in relation to the rectum, namely: cystic and fibro-myxomata. A rather remarkable fact was that the two cases of this unusual condition, here shown you, were operated near the same time. One, as you observe, was situated between the rectum and vagina and was removed by abdominal incision and opening the pelvic peritoneum. By careful dissection, I removed the growth, including the capsule, intact. The other tumor, you observe, was in the concavity of the sacrum and was removed by opening the perineum posterior to the rectum. In the first case no definite attachments were observed. The other was attached to the lateral and anterior surfaces of the sacrum (Figs. 4, 5, 6). Cases of this type may be seen and operated upon without proper pathological study, hence rendering our statistics faulty. These neoplasms may recur or they may degenerate into myxo-sarcomata.

It is fairly easy to say that a nodular sessile mass on the middle or upper rectal wall in a patient, who has passed the age of 40 years, is most likely cancer, because we consider this the cancer age. But, may I ask, what is the cancer age, and why? A correct answer to this query will go a long way toward solving the cancer problem. When rectum and colon are studded with these adenomatous growths, too often the case is treated without regard to their potential malignancy, until metastasis occurs. These are frequently seen by me, owing to the large number of very chronic amebic ulcerations of the large gut referred to me after years of repeated fanciful cures and recurrences. These frequent complications of chronic ulcerations emphasize the importance of early and adequate treatment of the primary conditions. Whether these are malignant or not, they must be dealt with in a radical manner, that is to say, by right side colostomy, short circuit, colectomy or proctocolectomy.

When I see an epithelioma so early that metastasis has not occurred, I consider both patient and surgeon fortunate, as usually these and other forms of cancer occurring at or near the anal margin or in the anus are in a fatal zone. They are usually referred to the radiologist, with

Fig. 4.—Fibro-myxoma between rectum and vagina.

Fig. 5.—Fibro cystic myxoma in concavity of sacrum.

hope, even though it is deceptive. I have never known a cancer in any part of the alimentary canal to be cured by either x-ray or radium. Mr. Miles, chief surgeon of the London Cancer Hospital, said to us that he had known these agents to cause but never to cure cancer of the gut, and they almost always caused a stimulation of the growth and an earlier death than if the condition were left alone. If the case is operated, the surgeon must take a wide perineal excision after permanent colostomy. My friends know I hate to appear dishonest or unfair, but is not one day's hope worth more to an agonizing sufferer than a year of despair? Hence, I refer late cases for radiation. So the most important point in the treatment of cancer of the rectum is, an early diagnosis.

There are several methods of procedure, each having its advocates. Each is good in some cases, and none is good in all. Each has its place. Is any one method practiced in all?

I have performed the perineal, and the combined abdomino-perineal one stage and two stage operations. The patient's age, the age and extent of involvement, coupled with a knowledge of fair averages, should aid in making a decision as to the method of procedure to be chosen. If a cancer involves one-third of the gut wall, there is less likelihood of extensive and far-reaching metastasis than if three-fourths of all of the circumference of the gut is involved. Metastasis is more likely to occur early in the fixed portion than in the upper free portion of the rectum and sigmoid. A young and plethoric patient usually develops metastasis earlier in proportion to these deciding factors.

If a cancer involves one-third of the anterior gut wall in a woman past the age of fifty years, the prognosis would be infinitely better than if the patient were a man. Also the perineal operation would not only be more acceptable but the prognosis both as to immediate and end results would be better. It is in this class of cases that I have, in at least, two instances removed the posterior vaginal wall, both of which cases have passed the five-year period, and would be considered well. The peritoneum must be opened in all such cases and the pelvic colon brought down sufficiently to remove the fat and mesenteric glands some distance around and above the neoplasm. If over two-thirds of the gut circumference is involved in any case, a very guarded prognosis must be made, and the surgeon need look only for distant migrations to verify this pre-operative prognosis.

While witnessing operations for cancer of the rectum in London last summer, some of our Americans arrived at the conclusion that they either exaggerated their statistics of cures, and minimized their operative mortality, or else, their success was dependable upon two factors; one being the seemingly earlier diagnosed cases, the other, that each of the surgeons I witnessed performing complete proctectomy for cancer of the rectum, used spinal analgesia, which they claim has greatly reduced the mortality.

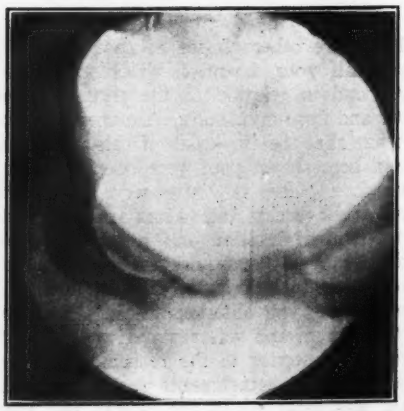

Fig. 6.—Fibro cystic myxoma in concavity of sacrum.

If a patient dies of any complication, for example, peritonitis or anuria, following any operation for cancer, it is an easy matter to confuse statistics. I do not bring this as a charge, but I readily see how a perfectly honest surgeon may gratify a desire.

We hear many reports of internal cancer being "improved" and some cured by x-ray or radium. A definite cure of a definite cancer of the rectum by radiation will be another curiosity added to statistics.

CONCLUSIONS

Cancer campaigns have aroused laymen more than physicians.

Text book classical symptoms are signals only of late cancer.

Achylia gastrica associated with other evidence of gastro-intestinal disturbances in the "cancer age" is a danger signal.

Proper methods are given and emphasized.

Adenomatosis and polyposis demand more than watchful waiting. Adenomatosis may be associated with tuberculosis and metastasis, for these growths often occur in the lungs and mediastinum.

Radical measures, such as ileo-cecostomy, colostomy, colectomy and proctectomy may be required.

Other and rare tumors, for example, myxomata, may degenerate and become myxo-sarcomata.

Cancers in or encroaching upon the anal funnel are in a fatal zone, metastasize early and demand very early radical procedures.

Methods of performing proctectomy must be chosen to suit the individual case.

There are evidences which aid in giving a preoperative prognosis.

Radiation is not considered of curative value in intestinal cancer.

DISCUSSION (Abstract)

Dr. G. C. Mizell, Atlanta, Ga.—The onset of malignancy is so insidious that if one is to be guiltless of allowing cancer to pass by the operable stage, one must make such an examination in every patient who presents such common symptoms as constipation, skin tabs, menstrual, ureteral, prostatic and vesicle disturbances. Indeed, cancer of the rectum may advance to the inoperable stage without presenting objective symptoms. So if one is to be entirely free from the danger of criticism, one must use every available method of examination with every patient he sees.

Without doubt there is a field among physicians and surgeons alike for an educational campaign of this kind. The profession should be aroused to its responsibility in this respect. Cancer of the rectum, unlike cancer in the rest of the gastro-intestinal tract, is accessible to touch and can be brought into view. The time should soon come when every cancer of the rectum will be recognized with the first presentation of symptoms or at the first examination. Then the experienced rectal surgeon will be enabled to reduce his motality and increase his percentage of cures.

Proctoscopic examination gives much information not obtainable by digital examinations. In fact the proctoscope is indispensable in differential diagnosis.

X-ray examination of the rectum after a barium enema helps in determining the location, size and shape of malignant tumors.

Dr. Jelks rightly calls attention to the value of the upright position in making a digital exploration.

From my limited observation of polyposis of the colon, I cannot agree with the idea that this disease should be classified as malignant and treated accordingly. Three patients who have been under my observation, and treatment for an average of ten years, have had as comfortable an existence as they might have had with surgery, without undergoing the high mortality risk. One patient, who had a cecostomy, with no incontinence for three years, preferred to have the artificial anus closed three years ago and to tolerate the treatment of the polpys and stricture, even though dilation weekly has been necessary.

Dr. Jelks (closing).—It is not only an easy matter to make a digital examination, but it is our duty. I have cases referred to me often in which not even the digital examination was made.

I examined a cancer which had not only progressed to a late stage but had actually ruptured the rectosigmoid septum, which several physicians had failed to discover. The patient is alive and happy today. A peroneal excision of the rectum was made and the pelvic colon brought down and made into a new rectum.

One does not need a proctoscope to make a diagnosis that something is wrong. One should have a proctoscope and sigmoidoscope, but they are dangerous in inexpert hands. I have had them pierce the gut.

EYE, EAR, NOSE AND THROAT

OCULAR NEUROSES*

By W. T. DAVIS, M.D.,
Washington, D. C.

It must be clear after consulting the ophthalmic literature on this class of disorders that there is no unanimity of opinion on the subject.

A certain percentage of patients who come to every consulting room with nervous eyes are to be pitied not less than the ophthalmologist. They are classed in our minds as "neurasthenics," an unfortunate diagnosis, which means nothing. They suffer from a derangement of the nervous system with consequent eye symptoms, and they suffer just as truly as a patient with glaucoma or iritis. These patients may be divided into several groups.

(1) *The Hypochondriacal.* — These patients fear serious disease of the eyes as a result of trivial ocular symptoms, or even normal conditions, such as muscae volitantes.

If they have beginning presbyopia they fear they are going blind, and mild melancholic states may be induced. Of course, no such state could be caused by beginning presbyopia. We must realize the nervous state of the patient as the cause of the neurotic symptoms and not the effect. A normal individual does not fear blindness when he begins to be presbyopic. In more marked cases we may find the exhaustion fields, seen frequently in neurotics.

(2) *Neurasthenia.*—In this disease we often see Rosenbach's symptom, (trembling of the lids when the patient is told to close the eyes), scintillating scotoma, and photophobia. There is early fatigue in attempting close work; blurring out of the letters on reading, headaches often in the nape of the neck and extending to the shoulders and upper dorsal region; and the fifth nerve in any of its ramifications may be involved.

The visual fields are normal, or the fatigue field is noted, or the color fields may show interlacings. The characteristic findings in the neurasthenic field, as in all these forms of neuroses, is that they do not correspond to any regular findings, but are irregular, conforming to no type, bizarre. Irregularity of the pupils may be noted.

Before a diagnosis of neurasthenia is made it is essential to eliminate organic disease and to substantiate the diagnosis by a general medical survey of the patient.

(3) *Copiopia or Nervous Asthenopia.*—These cases present symptoms identical with asthenopia due to refractive errors or muscular anomalies. The symptoms vary greatly on different days. The patient is unable to accomplish much eye work on account of early fatigue. There is dull pain about the eyes, headaches, blurring of vision and a feeling of dryness of the globes, heaviness of the lids, etc. The symptoms vary greatly in different cases.

Examination of the eyes shows no adequate explanation for the symptoms, or what is more important, after any refractive error or muscular anomaly is corrected the symptoms continue.

The condition is due to the weakening of the nervous system from some cause, such as inflammatory changes in the uterus, sexual disturbances or anemia.

It is obvious that the relief of the ocular symptoms can only result from the correction of the cause determining the nervous state.

(4) *Hyperesthesia and Anesthesia Retinae.*—The first named is noted frequently in neurasthenic and hysteric subjects, but necessarily, there are definite findings in the fundus: veiling of the fundus due to mild edema of the retinae; retinal striation in the neighborhood of the disc; light streaks along the course of the larger vessels and changes in the choroid.

The causes of this condition are physical ones, errors of refraction, exposure to brilliant light, sexual disorders and the like.

Anesthesia of the retina or nervous asthenopia is apparently a name for a condition already described. The symptoms are the usual ones in these states: blurring of the letters, early fatigue on attempting close work, headache, defective accommodation, muscae volitantes, etc.

The cause and treatment of these two conditions resolves itself into a correction of ocular strain and a careful physical examination to determine the cause of the disturbed nervous state. Nasal disorders should always be considered, and search made for them.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

The disturbances of the visual fields is characteristic in that they follow no type of organic disease and change constantly. There are seen the shifting or displacement type, exhaustion type, unstable concentric limitation, etc. These are the fields, it will be noted, of nervous exhaustion.

(5) *Hysteria.*—There is scarcely an ocular symptom or organic disease which may not be simulated by this protean disease.

There are, however, certain symptoms of diagnostic value which should be mentioned. It is important to recognize this disease when it appears before us with ocular symptoms, as not only will it fail to help the patient, but will do positive harm should it not be recognized.

The visual field in hysteria is peculiar to this disease in that the color fields are less affected than the fields for white. This is opposite of other diseases where limitation of the visual field occurs, as in these conditions the field for colors is more affected than that for white. The former condition is positive evidence of hysteria, and coupled with other hysteric stigmata is sufficient for diagnosis. Reversals of the color of the fields may also occur.

Spasm of the orbicularis associated with amblyopia and amaurosis without changes in the fundus is very suggestive of hysteria. Monocular diplopia or polyopia is a very frequent symptom. It may be unnoticed by the patient until brought out by this examination. Photophobia may be so marked as to suggest organic disease. Hysterical spasm or paralysis of accommodation is seen, the former more frequently.

All sorts of palsies of the external muscles may be noted. It is unnecessary to weary you with the many manifestations of this disease, which is easily recognized in the vast majority of cases, by the experienced ophthalmologist.

Some cases present great difficulty in diagnosis, particularly when complicated with organic disease. The cases to which I wish to invite your attention do not appear to belong to any of the above groups. They are not neurasthenic, hysteric or hypochondriac. They have no physical disability which would act as the underlying cause of the disorder. For some time I was at a loss how to classify them, or what to do with them. Some were referred to the neurologist and some to the internist without assistance to the patient or to me. These patients suffer just as truly as do those with organic disease, and deserve our consideration and time as much. This kind of case I have grouped as psychoses.

The symptoms here differ little from those symptoms described under the above neuroses. They have chronic eye disability. In the majority of cases they complain of pain and discomfort in the eyes or about the eyes on attempting to use them. This may be so slight as only to annoy or it may be so severe as to be utterly incapacitating. They do not imagine this pain. They really have it.

These cases are first carefully studied from an ocular standpoint and any error of refraction, muscular anomaly or inflammatory disturbance is corrected. Naturally before eliminating the ocular apparatus as a cause of the symptoms a most thorough and painstaking examination of this apparatus must be made. The importance of this is obvious. A false diagnosis would lead the oculist into a very humiliating position and the patient into an unfortunate situation. To treat a patient for a psychosis when she has a low grade uveitis will hardly mend matters. We must be absolutely sure of our refraction and muscle work, since a slight uncorrected error of refraction or muscle imbalance may produce at times profound ocular disturbance or even more far reaching effects. This eliminates the eye as a cause of the symptoms.

After the patient has worn the proper correction for a fortnight and the symptoms still continue, it is obvious that we have more to deal with than an ocular condition. A medical survey, including teeth, nose and throat is made and any faults found are corrected. This medical survey must be as carefully and expertly accomplished as the ocular examination. We cannot afford to assume a functional nervous disturbance with ocular symptoms unless we can be quite sure any physical causes have been eliminated. An intestinal stasis with mild auto-intoxication can very easily be overlooked, as may negative pressure sinus eye headaches. The examination may lead us into consultation with several colleagues before we are sure that all physical causes have been eliminated. If now the symptoms continue we know we have a nervous condition to study.

It would seem that perhaps we, as a profession, are too material at times. We should concern ourselves also with the mental or the spiritual side of the individual. In order to approach this side of the case we should proceed with tact, patience and a generous and kindly desire to help.

It is my custom to go into the family and previous history in a very painstaking manner, following this to inquire into the previous life of the patient, habits of eating, sleeping, reading, thought and work. Mark Twain says: "The real life we lead is the mind life, our thoughts, and the outside life is merely the clothing and buttons." It is this real life, this mental life of the patient that we must investigate, and in order to accomplish this we have to proceed carefully and tactfully. To quote again, though not exactly, Mark Twain has observed that the truthful outpouring of one's mental life occurs in a love letter, and this is because it is for one person only, and will never be seen by any one else. In order to share our patient's real life, we must so obtain his confidence in our integrity of mind and heart, that he may feel that we and no one else will share in his mental life. Thus one may obtain a very intimate knowledge of the patient and establish a mutual confidence. Also one will impress the patient with one's interest and genuine desire to help him, and this is half the battle.

One should attempt to bring out particularly any domestic difficulty, sexual trouble, or causes of fear or apprehension. This can be accomplished usually. Often one of the above factors will be the underlying cause of the heart and sole sickness which has reduced the individual to a state of mental inequilibrium.

If we are successful in our search for the cause, it often taxes our resources to the utmost to help these patients. Each case is a distinct problem and requires patience, sympathy, and perspicacity, to enable us to assist them.

Some cases are beyond human assistance, those who have lost all, and have been completely crushed in spirit by that loss. Yet, even in these cases we can often be of help.

I shall cite several cases to illustrate my conception of them, which has not been made clear. I admit I find it difficult to express my conception of these cases, though in my own mind they occupy a very distinct group. They are not neurasthenic, hysteric or hypochondriac, and their ocular symptoms are not due to organic disease of the ocular apparatus or other part of the body, or to eye strain.

In reaching a diagnosis, if the last mentioned conditions be eliminated, we know the residue is a psychosis.

Unless one is prepared to give much time, patient study and investigation to this class of patients, he should not undertake to treat these cases. Yet many of them have wandered far in search of help and their appreciation is great when they find it. It is gratifying to the physician oculist to feel that he has studied his case deeply and given his best efforts and that these efforts have been crowned with success. This class of case cannot be referred: it must be handled by the oculist himself.

Case I.—White female, age 19, resided in a nearby Virginia village and came into the city, an hour and a half by trolley, each day.

She contemplated giving up her position on account of her inability to use her eyes. She had persistent asthenopia and orbicular spasm. She had had numerous pairs of glasses and various kinds of collyria and endocrine treatment.

The ophthalmic examination was negative except for a mild degree of refractive error. There was some hypertrophy of the thyroid and a suggestion of Von Grafe's sign. Her basic metabolism was normal. A general survey and laboratory findings were normal. She was high strung, intellectual and well educated and deeply resented her ocular disability. She was sensitive and proud and had much family clannishness, so it was most difficult to get at the root of the trouble. It was, however, finally determined that her father was an habitual drunkard. This depleted the family finances, made it impossible for her to have her friends come to see her at home, and ended in social ostracism. For a nature like hers this, of course, was very severe, and the ocular neurosis was the net result.

She was advised to give up her home in order to avoid the three hours daily travel on the cars, as well as to have a life with some peace and pleasure. She did this, taking up her residence with an aunt in the city, and in three months her ocular symptoms had disappeared.

Case II.—White female, department clerk, the daughter of a deceased naval officer. The ocular and general physical examination were negative. She had had numerous ocular examinations without relief. The condition underlying her trouble was very difficult to discover. It was about as follows: Her earlier life was full of travel, pleasure and excitement, a highly colored life.

For some six years she had been at the grind of the treadmill in the Government service. The realization that she had a life sentence had lately come upon her and the thought was appalling. She rushed into social things which wore her down, as she had to work all day. She also began reading late at night, writings (mouthings) on psychology, the ill smelling, vile hash that is sold today as psychology. This polluted her mind, misdirected her imagination, and made her morbid.

Then her eye symptoms developed as follows: She had nausea when she used her eyes for near work. This nausea was persistent and lasted almost all the time, as she had to use her eyes all day. There was a persistent, nagging brow ache and obstinate asthenopia. She ate her meals at cafeterias and such places, but could not force herself into them to eat her dinner after her day's work.

She was a sensible woman and had an earnest desire to obtain relief. These two factors were invaluable aids. She was gradually worked into a regime of proper food, vigorous out-of-door exercise and good reading.

In two weeks she returned in a radiant frame of mind, entirely recovered and realizing into what a black mood she had allowed herself to fall.

Case III.—White female, age 26, private secretary, had persistent and annoying headaches after the use of her eyes for near work. It was much worse if the eyes were used in artificial light.

All examinations were negative except for a moderate degree of refractive error, which was properly corrected without affording relief.

According to her story the man for whom she acted as secretary was trying to seduce her. This kept her in a highly nervous state and caused insomnia, loss of appetite, weight, etc.

She was advised to obtain a transfer and so relieve this situation. She did not return, hence the result of the suggestions is unknown, but I feel sure the cause of her trouble was a neurotic one. Whether it was as she stated is a question, but there was a sexual neurosis.

Case IV.—White female, age 35, housewife, had absolute inability to use her eyes, severe photophobia and blepharospasm.

Her father and husband, both physicians, thought she had some severe ocular lesion.

The examination could not be accomplished until she had been given a general anesthetic, as it was impossible to see the cornea or fundus.

I suspected phyctenular ulcer. The ophthalmic examination proved negative, as did the general medical survey.

She was an unusually hearty and vigorous woman. It was found that she had suffered great mental agony the year before, her husband and father both being at the front in France. During this period her first baby was born and died. She had most ardently desired this baby.

The circumstances threw her into a profound melancholia which, it had been feared, might be lasting. On the return of her husband and father she had recovered from this, with the development of the eye symptoms. At the time she consulted me she was again pregnant. My thought was that should she be safely delivered of a sound and normal infant, and her mother desire fulfilled she would probably recover. Such has been the case. She is greatly improved and will undoubtedly recover entirely.

Case V.—White male, college student, was unable to continue his studies at college on account of inability to use his eyes. There were the usual symptoms of a nervous asthenopia. The ocular examination was negative. He had had numerous examinations and numerous pairs of glasses. Both he and his family felt sure there was some serious organic disease and were very apprehensive.

His family were induced to leave him with me and return to their home. This gave me an opportunity to study him, using some simple local treatments meantime for a fortnight. When his confidence had been gained it was found that he had been masturbating excessively. As he was a sensible boy the situation was gone over with him. It was explained that there was no ocular disease or even need of glasses. His recovery was prompt.

Case VI.—Technician in a public health hospital, age 38, a white female, presented the usual history of profound and obstinate asthenopia. This was growing worse and was rapidly approaching a condition where she could not continue her work with the microscope. Numerous prescriptions had been given her for glasses, each differing only a little from the other.

She was big and strong and healthy and the usual examinations showed nothing abnormal.

The history elicited the fact that she was quite alone in the world and had lost her fiance a few days previous to the wedding about eighteen months before. The ocular symptoms began shortly after this.

She was very sad and suffering a great deal with suppressed emotion. I persuaded her to talk freely of herself and her empty and troubled existence. But what could one do to remedy such a condition? At this time a prominent clergyman was preaching in Washington and his services were strong and vigorous and very appealing. I suggested that she hear them, and after a little I asked this clergyman to talk with her, which he did. Shortly after this she was ordered away from Washington, and about six months afterwards I had a cheerful note from her saying that she had improved much, but still had some trouble with her eyes. A year later she was passing through Washington and came to see me. She was cheerful, resigned to her fate and her eye symptoms had disappeared.

927 Farragut Square

DISCUSSION (Abstract)

Dr. J. W. Jervey, Greenville, S. C.—To some of us it may seem that Dr. Davis has deliberately described a distinction without a difference, but a careful and thoughtful consideration of his proposals will soon convince us that he has not only approached but mastered a most difficult problem.

For some years I have had grave doubts as to whether or not many of these patients belong to the field of the neurologist or the psychiatrist, for certainly not all of them belong in the realm of ophthalmology. It is not the patient's visual apparatus that is at fault.

The perimetric relations of the color and form fields is a generally accepted phenomenon, but it by no means follows that all hysterics exhibit this peculiarity, and it is entirely possible, too, that there may be some ocular conditions in which retention of the normal color fields will go hand in hand with a defective field for white, such, for example, as in the early stages of glaucoma.

Again, some of these presumably psychotic patients will not cooperate sufficiently for a reliable perimetric finding. Some of them are on the borderline of insanity. Some will even yield a family history of insanity, and in some instances they come very near persuading the conscientious oculist (I like that term better than "ophthalmologist") that he is a fellow-traveler in the same direction. More than once I have experienced that uneasy feeling.

The reason the "eye-sight specialists" and "opticians" and "optometrists" and "traveling eye doctors,"

et id omne genus, do such a thriving (and often dangerous) business is that the rank and file of real oculists do not like to bother with the tiresome routine of refractive work. Yet, I venture to say there is no more important work, take it by and large, in the whole domain of ophthalmology.

Dr. Davis is a careful, painstaking, conscientious and thoroughly competent master of the art of refraction. But how many of us can be sure we have provided the best obtainable refractive correction (statically and temperamentally), as well as eliminated every possible physical source of contributive morbidity before we place the patient in the "psychosis" class?

Any reasonably well educated person can be taught the principles of static refraction to a mathematical certainty, but only thoughtful and sympathetic observation can determine how much of the error that is scientifically demonstrated to exist can be comfortably accepted. That is where the art comes in.

All of you have the science, but not all of you are possessed of the art.

Dr. C. A. Bahn, New Orleans, La.—The one symptom that characterizes every patient mentioned in Dr. Davis' paper is fatigue. Every one of these patients show signs by the behavior of their eyes that they are tired all over. This fatigue is very often due primarily to faulty living, physical and mental, and not to a specific germ disease.

When one or more of the parts of our body do not function properly, often due to faulty living, we become oversensitive and irritable, and certain parts of us for reasons not thoroughly understood manifest this oversensitiveness or irritability before others.

It has been estimated that our eyes use between twenty and forty per cent of our vitality, hence it is not hard to understand why ocular function is one of the very first to show in one form or another that something is wrong. In these cases and many others the something that is wrong is not entirely the eye, but is elsewhere in the body.

These patients are not cranks or nuisances if one understands them; they are human beings just like you and I, who often from circumstances beyond their direct control and understanding, have at least for the time being, overstepped their limitations and are paying therefor in discomfort, mental or physical.

They derive no more pleasure from ill health, pain, and functional limitations than would you or I. Because we cannot see their ill health, their painful sight or their inability to use their eyes a reasonable length of time, in our objective tests does not mean that they do not exist.

The sooner we ophthalmologists realize that a thorough understanding of the human eye is not enough, that we must understand the human being of which the eye is but a small part, that our objective examinations do not always explain the patient's complaint, that faulty living is a powerful factor especially in these patients whose symptoms are unexplained by purely objective findings, that the prescription of even carefully selected lenses forms but a small part of our duty to the patient and that practical help, in the way of corrective living, physical and mental, is often an important factor in recovery, the sooner will we increase our usefulness to the public who will in turn show greater confidence in ophthalmology and in regular medicine.

Dr. Tom Williams, Washington, D. C.—Would it not be wiser to send a case of psychosis to a neurologist, who is better versed in the intricacies of psychotic behavior?

To the factor fatigue must be added pathogenic toxin. All of Dr. Davis' cases were of exhaustive grind, as we call it. There had been an over-stimulation of the whole organism psychically. We have all seen patients who have lost ten or twenty pounds in weight from an emotional situation where they were eating well but not sleeping. So if the ophthalmologist can soothe the patient's emotional agitation by changing his viewpoint, he is not changing his patient by psychotherapy but he is changing the physical condition of the patient by relieving him of the debilitating condition of an exhaustive emotional drive.

Babinski has long maintained that a hysterical visual field is a medical fallacy. There is no such thing as a restricted visual field from hysteria alone. A visual field observation is very difficult, especially with hysterical patients. The condition there must be from the same cause, a mild toxic state or an undetected tumor of the brain. Of 200 cases of brain tumor which I analyzed ten years ago that came to operation all had been diagnosed as hysterical in the beginning. We should be very careful when we find a restricted visual field, in saying that it is due to hysteria. We should say it is a hysterical condition highly suggestive because of some general condition which may be nervous or toxic. If the patient is too hysterical we should find the mechanism.

Dr. Davis (closing).—There are certain cases which cannot be referred to the neurologist or the internist. They have eye symptoms which are due to functional nervous derangement and it does not take an expert neurologist to relieve them. It does not take an artist to do this work. Any one of us can do it if he takes the time and trouble. I have referred these patients to the neurologists, and they come back to me. A psychoanalyst does not work with this particular type of patient. If you insist upon referring them, they are apt to fall into the hands of irregular practitioners, because we do not take the time and interest to go into their cases far enough.

This is no place to go into the subject of the visual fields in hysteria and otherwise. We know the extreme difficulty of taking visual fields in neurotic patients, but in this work I do it to eliminate real hysteria. As soon as you get into real organic nervous disorders the case should be referred to the neurologist.

CERTAIN BORDERLINE CASES OF OPHTHALMOLOGY AND RHINOLOGY*

By LEE MASTEN FRANCIS, M.D.,
Buffalo, N. Y.

This most fascinating field of ophthalmology has been uncovered and explored within the last twenty-five or thirty years. During this time so much has been learned and written upon the subject that it is with much temerity that I have selected it to discuss before this Section of the Southern Medical Association. Yet no one who listened to that most excellent symposium on papillo-edema and choked disk at the recent American Academy meeting in Montreal failed to feel greatly stimulated and benefited by the discussion evoked.

The scope of cases which might come up for consideration under the title chosen is so very wide, ranging all the way from low grades of asthenopia to often times complete and permanent amblyopia, that no one presentation of this sort can approach the entire group.

The frank cases of orbital involvement with obvious symptoms and signs needs no mention before an audience of this sort. The asthenopias dependent upon nasal conditions require separate handling. There is, however, a group of amblyopias, definitely dependent upon morbid process in the accessory sinuses, the early recognition of which means relief and the saving of vision. Ofttimes the symptomology is confusing and perplexing. Yet, from a theoretical standpoint, at least, they should present manifestations which should divorce them from those arising from cerebral pressure, toxic amblyopia and disease of the central nervous system. It is with this group that this paper will concern itself, especially from the clinical standpoint.

No other field of ophthalmology requires more cooperative endeavor. The ophthalmologist, rhinologist, radiographer, neurologist and technician play equal and responsible roles. Because the patient's first symptoms are usually those of impaired eyesight, he first consults the ophthalmologist. The ophthalmic signs are usually the most definite and clearly cut. Because the ocular findings furnish an index as to the success or failure of treatment, these cases properly remain under the observation of the ophthalmologist, who, in the average case can best watch the results of treatment.

*Read in Section on Eye, Ear, Nose and Throat, Southern Medical Association, Eighteenth Annual Meeting, New Orleans, La., Nov. 24-27, 1924.

ANATOMY

On three sides of the organ of vision are massed air passages in communication with the nose, exposed to frequent and various nasal infections, of a collective capacity of more than double that of the nasal cavity (Whitnal). All are lined by a mucous membrane which, again quoting Whitnal, is so closely blended with periosteum as to constitute "a muco-periosteum." In all of these passages are venous branches which pass into the orbit and through the ophthalmic veins drain into the cavernous sinus. While the direction of lymph channels is still in doubt it is likely that they follow similar routes. These channels constitute a splendid highway for the passage of infection. The sphenoid sinus is in close proximity to the optic foramen. The canal of the optic nerve skirts its upper inner wall, and frequently the wall separating the nerve and the sinus is only parchment-like in thickness. Frequent anatomical variations such as diverticula and dehiscence make this relationship more intimate and inimicable. In a study undertaken some years ago by the author of 100 adult specimens taken at random from the dissecting room of the University of Buffalo, one-third of the sphenoids observed presented walls thin enough readily to transmit morbid processes, while an additional 17 per cent showed diverticula and dehiscences. The posterior ethmoids are frequently in very close contact. Even the frontal sometimes extends backward along the roof of the orbit far enough to produce definite ophthalmic symptoms.

The anatomical picture would be incomplete without referring to the faulty and inadequate drainage arrangements. Apparently designed for gravity drainage with the head in the dependent position, the erect posture has forced the drainage openings of the sphenoids to a point nearer the roof than the floor, so that the sinus becomes half full before gravity drainage becomes effective.

The most important facts, however, which are necessary to an understanding of the ophthalmic symptomology are (quoting from Peters):

(1) The peripheral fibers of the optic nerve supply the retinal area immediately surrounding the disk as Fuchs has taught. It is also probable that the peripheral position of these fibers is maintained through the nerve. Therefore, disturbance of the blind spot to which van der Hoeve first directed attention is readily explained.

(2) The optic foramen and optic nerve are in close proximity to the sphenoidal and frequently the posterior ethmoid.

(3) The posterior vein of Vossius enters the optic nerve in the optic foramen, occupying in it a central position, and passes back toward the chiasm. Into this vein pour the tributaries of the nose and the posterior parts of the orbit. This vascular system is direct route from infected areas to the optic nerve substance and the papillo-macular bundle. Whether the mechanism of infection is by extension or carried by the blood stream is more a matter of controversy than of clinical moment. Whatever the avenue, toxic products invade the subdural and subarachnoid lymph spaces, which accounts for one of the earliest reliable evidences of the paranasal etiology of amblyopias, namely, enlargement of the blind spot and central scotoma.

OPHTHALMIC DIAGNOSIS

History.—A careful history is of great importance. Especially to be ascertained is the story of acute nasal infection "cold in the head," "grippe" or throat infections in the fortnight or so preceding the visual symptoms. It has been my experience that details of nasal involvement are frequently forgotten and brought out only by careful questioning because the severity of the "cold" sometimes is not proportionate to the result and naturally is discounted by the patient. For the same reason absence of definite history of nasal infection should not throw the examiner off his guard.

The rapidity with which impairment of vision comes on and the speed of its progress is one of the most important collateral symptoms of amblyopia from accessory sinus disease. Contrasted with the more gradual onset of lowering of vision in brain tumor or brain tumor equivalents the amblyopia of accessory sinus disease is very rapid.

Bilateral amblyopia while encountered, is not so common as unilateral. This symptom is probably of minor importance and should not be weighed too heavily in the estimate of a case. However, when the process involves one eye only, as is usually the case, it is more probably of nasal origin than cerebral or disease of the central nervous system.

Perimetry, the Blind Spot.—Peter has shown that perimetric studies furnish the most constant, consistent and valuable information. As van der Hoeve first pointed out, the enlargement of the blind spot of Mariotte, is most important because of its early appearance. As has been stated above, the explanation rests upon the fact that peripheral fibers of the optic nerve supply the retinal areas immediately surrounding the disk. These are the fibers first involved in accessory sinus disease, particularly when the path of infection is by contact. Enlargement of the blind spot is the obvious sequence of toxemia of the papillar area. The presence of enlarged blind spot in sphenoidal, posterior ethmoidal disease, if carefully searched for, can be counted on to be as constant a symptom as may be found in the field of diagnosis. It is of less frequence in anterior ethmoiditis, at least early, but is found when the anterior ethmoid disease extends to the posterior, or even when a large frontal extends along the orbital roof far enough backward to come in relation to the optic foramen.

Central Scotoma.—Some cases are seen in which central vision is early and seriously impaired, with or without impairment of the peripheral fields. In this type of case, the blind spot may show the usual enlargement. The peripheral field may show lateral or altitudinal contraction which in the event of bilateral sphenoidal disease may be bilateral. When central scotoma is the dominant symptom, the infection is more apt to take place through the posterior vein of Vossius by which the toxemia is carried directly to the papillo-macular bundle, according to Peter, who has reached this conclusion, as a result of perimetric studies. This explanation has a rational anatomical basis and is substantiated by clinical experience in the rapid recovery of vision without further changes in the visual fields after the drainage of infected sinuses.

The Ophthalmoscope.—In early cases the ophthalmoscopic evidence is usually negative. Slight and dubious blurring of the nasal margins of the disk, an equally indefinite impression that perhaps the nasal wall of the cup is somewhat folded in, with increased fullness of the veins may be and frequently are the only ophthalmoscopic evidences. However, as the process progresses, changes in the disk may appear, dependent upon the violence of the process, and possibly the route of the infection. In fact, the ophthalmoscope furnishes an index of the extent and violence of the process. Moderate blurring and in the latter stages, papillo-edema of the disk with obliteration of the cup becomes a papillitis, and in my experience only when symptoms of cerebral pressure appear, although one of my cases showed an elevation of 2½D. with no other evidence of increase in cerebral pressure. Spinal puncture showed no increase of pressure or cell

count. No symptoms of meningitis or meningeal irritation developed, although the patient was carefully watched with this in mind.

Pupil.—Pupillary studies are of rather indefinite clinical value, although in many cases the pupil on the affected side is slightly larger and slower to light reaction than on the sound side.

The Globe.—Slight proptosis with displacement outward, lameness upon excursion of the globe inwards, with some soreness upon backward pressure are interesting collateral signs which dovetail with more definite diagnostic signs.

I am not competent to speak of the diagnosis except from the standpoint of an ophthalmologist. I hope that the discussion may stress the diagnosis from the viewpoint of the rhinologist. The radiologist can and does frequently give valuable positive evidence. It is not the case which gives a definite shadow that puzzles but the one with definite ophthalmic symptoms of lateral sinus disease with negative radiographic and rhinological findings that confuse all of us. In some of the most striking cases from a clinical standpoint both the radiographic and rhinological reports have been negative although the ophthalmic diagnosis has been positive. This point is well brought out in the cases of mine in which ventilation of the sinus in one, and suction in the other was followed by resolution of a papillitis and return of vision to 6/5, although in the former, five years after his experience the affected nerve was decidedly pale. The presence of pus or fluid in a sinus is therefore not necessary to establish a diagnosis of amblyopia from sinus involvement. Sluder and Vail's observations, supported by abundant clinical evidence, make this point quite clear. Whether the pathology is as Sluder and Wright avow, one of the hyperplasia or whether the toxic agent is one released by drainage alone, I am not prepared to state. Certainly Sluder's experience and Wright's pathological findings present very convincing data. From a practical standpoint, perhaps, the question is more academic than essential.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis of a given case of amblyopia lies between:

Brain Tumor or its equivalent. Here the ophthalmoscope will frequently make the decision —choked disk as compared to papillitis, no enlargement of the blind spot, a bilateral process instead of a unilateral, slow onset, as compared to a rapid lowering of vision in sinus disease. There are other evidences of cerebral disease not present in sinus disease.

Meningitis.—The general symptoms of meningitis are usually so dominant that confusion with accessory sinus disease is not unusual.

Toxic Amblyopias are usually bilateral, with pericentral scotoma as the most uniform perimetric finding which may include the blind spot. The absolute scotoma involves a relatively large area and there is a history of exposure to some toxin like quinin.

Insular Sclerosis.—In this disease the scotoma is quite apt to be accompanied by irregular contraction of the form fields and pallor of the temporal halves of both optic disks.

Hysteria.—The concentrically contracted visual fields, the so-called tubular fields of hysteria, are too characteristic to require comment.

Pituitary Disease.—The collateral evidence of pituitary disease usually stamps the diagnosis before it reaches the ophthalmologist, although as de Schweinitz and Halloway have pointed out, occasionally the patient's first observable symptom is failing vision. The scotomas of pituitary disease vary greatly as the above authors showed in a comprehensive contribution before the Section on Ophthalmology of the American Medical Association in 1912.

The ophthalmoscope can rule out organic changes about the disk such as colabomas, atrophic patches and other obvious causes for enlarged blind spots.

MEANS OF DIAGNOSIS

For the determination of peripheral fields, the ordinary office perimeter is satisfactory but quite useless for the study of the central fields and study of the blind spot. Some sort of tangent screen is necessary, whether Bjerrums' or any of the so-called scotometers to be found at the instrument makers'. The most practical all-around apparatus I have found for this work is Peter's campimeter. It gives accurate clinical results for the central fields and for the blind spot study. It is easy to manage, within the compass of every purse, and eminently satisfactory and practical. For the study of central fields, Haitz charts are valuable but the Lloyd stereo-campimeter which is large enough to include the blind

spot is probably the most accurate and satisfactory device. While it is a more elaborate instrument than the Peter campimeter, it is most satisfactory for accurate work on the blind spot and for the determination of the central fields.

CONCLUSIONS

If one can summarize in a few words, the characteristic phases of the amblyopias due to disease of accessory sinuses, the following features stand out:

(1) Suddenness of onset and rapidity of progress frequently without ophthalmoscopic changes;

(2) Usually a unilateral disease; and

(3) Early enlargement of the blind spot (van der Hoeve sign).

The prognosis is good if relief is prompt. Therefore, the diagnosis should be arrived at soon. To establish a diagnosis of accessory sinus disease, blind spot measurements must be taken early before the process has advanced to a point where the symptoms may equally well fit some other picture. Early study of the blind spot and the central fields may give information which means eyesight to the sufferer. The importance of early perimetric study of the central fields cannot be too strongly advised. This does not mean an incomplete or snap diagnosis. There is ample time to seek and obtain the opinion of the neurologist as to disease of the central nervous system or if brain tumor or its equivalent, and time for proper radiographic studies. But when the weight of clinical evidence in a given case points to an involvement of the accessory sinuses as the cause of amblyopia, the drainage or ventilation of the suspected areas should be thorough and complete. Inasmuch as the rhinological examination is sometimes reported negative despite positive ophthalmic diagnosis, I do not believe that delay is justified because of adverse rhinological reports. On the other hand valuable time should not be lost in brain tumors or equivalents by the opening of sinuses and unnecessary surgical attack. The present-day ophthalmologist armed with the ophthalmoscope, the tangent screen and the art as well as the science of medicine can usually, with the aid of his colleagues, give relief to this most interesting and fascinating, and withal satisfactory group of cases.

Southern Medical Journal

JOURNAL OF THE
SOUTHERN MEDICAL ASSOCIATION

Published monthly by the Southern Medical Association. Empire Building, Birmingham, Ala. Annual subscription $3.00. Single copies 25c each.

Entered as second-class matter at the Postoffice at Birmingham, Alabama, under Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in Section 1106, Act of October 3, 1917, authorized December 20, 1921.

DR. M. Y. DABNEY, Editor
C. P. LORANZ, Secretary-Manager

Vol. XVIII APRIL 1925 No. 4

EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Nineteenth Annual Meeting, Dallas, Texas
November 9-12, 1925

BACTERIAL ANTISEPSIS IN THE BLOOD STREAM

MERCUROCHROME

Conflicting testimony of the efficacy of intravenous injections of mercurochrome in bacterial infections is abundant in medical literature of the past two years. [1] [2] This is due to the fact that mercurochrome escaped from the laboratory into clinical medicine too soon, on the report of a few isolated and imperfectly understood cases of apparently remarkable recoveries.

Mercurochrome-220 soluble, which for the sake of brevity is called mercurochrome, was synthesized in the Brady Clinic about 1919, with many other mercury dye compounds, as the result of a systematic search for an antiseptic for practical use in the genito-urinary tract.[3]

E. B. Piper,[4] in 1922, after some preliminary animal experiments, first used intravenous injections of it in clinical work, in the treatment of moribund cases of puerperal sepsis. Some spectacular recoveries from infections following the use of intravenous injections of mercurochrome and also gentian violet were later reported by Hugh H. Young and others; and there is at present a very widespread clinical trend toward the use of both drugs. In a number of cases this treatment has been found inefficient and has perhaps caused organic damage. Violent reactions commonly follow the prescribed injection of 5 milligrams of mercurochrome per kilogram of patient's weight. There are headache, chills, fever, albuminuria, extreme diarrhea, and occasionally salivation.

In a recent paper upon the subject, Piper[5] offers further case reports and describes his newer technic which is a larger and more frequently repeated dosage of mercurochrome. He reports both good and bad results, including two deaths with anuria, the usual symptom of mercurial poisoning. He states, however, that these patients were moribund before treatment. He concludes that striking recoveries may result from the injection of mercurochrome in blood stream infections, but that it is a dangerous procedure, justifiable only in extreme conditions.

Hill and Colston determined the bacteriostatic action of urine[6] and blood[7] of normal rabbits after the injection of varying doses of mercurochrome. They employed doses representing respectively 1.0, 2.5, 5.0 and 10 milligrams of drug per kilogram of body weight, inoculated the urine obtained after this with colon bacilli, inoculated controls, and reported the degree of inhibition of growth of bacteria, that is, the bacteriostatic action, of the different doses. Bacteriostasis was not proportional to the quantity of mercurochrome injected, and

1. Young, H. H., and Hill, Justina: Treatment of Septicemia and Local Infections. Jour. Am. Med. Ass., 82, 9, Mar. 1, 1924.

2. Brill, T. C., and Myers, H. B.: Mercurochrome-220 Soluble and Gentian Violet. Jour. Am. Med. Ass., 84, 12, 879, Mar. 21, 1925.

3. Young, H. H.; White, Edwin C.; and Schwartz, E. O.: A New Germicide for Use in the Genito-Urinary Tract: Mercurochrome-220. Jour. Am. Med. Ass., 73, 20, 1483, Nov. 15, 1919.

4. Piper, E. B.: Treatment of Puerperal Sepsis by the Use of Mercurochrome Intravenously, with a Report of Animal Experimentation in the Chemical Disinfection of the Blood. American Jour. Obst. and Gyn., 4, 532, 1922.

5. Piper, E. B.: Blood Stream Infection Treated with Mercurochrome-220 Intravenously. Am. Jour. Obst. and Gyn., 9, 1, 150, Jan. 1925.

6. Hill, J. H., and Colston, J. A.: A Note on the Bacteriostatic Action of Urine After the Intravenous Administration of Mercurochrome to Normal Rabbits. Johns Hop. Hosp. Bull., 34, July, 1923.

7. Ibid, Nov., 1923.

some bacteriostatic action of the urine was noticeable after a dose as small as one milligram per kilogram. The bacteriostatic action of the blood of rabbits they found likewise to be temporarily increased after the injection of as little as one milligram per kilogram of body weight. The bacteriostatic action can not be increased in direct proportion to the size of the dose. This they interpret as being due to the fact that mercurochrome in small doses is excreted largely by the kidneys: in large doses, it is excreted very rapidly by the intestines. They conclude that the intravenous injection of moderate amounts of mercurochrome in treatment of urinary colon bacillus infections is justified.

GENTIAN VIOLET

In Gram's method of staining to distinguish certain broad general classes of bacteria, gentian violet has been in use for some time. Churchman,[8] in 1912, made the first elaborate study of its bactericidal properties. He showed that in a strength of 1-1,000,000 it prevented growth of a large number of microorganisms, and could be used as a method of separating from these, others which grew luxuriantly in the same dilution. He showed that although gentian violet in sufficient concentration was probably toxic to all bacteria, Gram-positive organisms were markedly more sensitive to it than Gram-negative. In about 90 per cent of the organisms studied, the parallelism of the Gram reaction with the toxicity of gentian violet to the organism was apparent. There were a few Gram-positive organisms which were not sensitive to gentian violet, and a few Gram-negatives which failed to grow in its presence. The colon bacillus ordinarily grew luxuriantly in a dilution which entirely inhibited Gram-positive staphylococci. However, one strain of colon bacillus, which was indistinguishable by the ordinary bacterological means from other strains, consistently failed to grow. He has reported two or three other instances of a similar atypical reaction.

Churchman suggested the use of gentian violet for disinfection of joint and other body cavities. The blood of rabbits, he finds, is bactericidal for about one and three-fourths hours after intravenous injections of gentian violet. In 1924,[9] he stated, however, that he had never been able to kill organisms circulating in the blood by intravascular injections of the drug.

Young and Hill first reported cures of staphylococcus septicemia by intravenous injections of gentian violet.[1] Piper has reported cures of this infection following mercurochrome therapy.

LINES OF DEVELOPMENT

Many lines of experimental work are suggested by these accounts of a few conquests of intractable infections. The responsibility for the use of these new drugs should be undertaken only by those with adequate laboratory facilities for diagnosis and checking of therapeutic results. If mercurochrome and gentian violet continue to be found useful in blood stream infections, the correct dosage is still a matter for future investigation. Apparently the commonly prescribed dosage at present is too large and often dangerous.

Most frequently, both drugs are given in a strength of one per cent. They have occasionally been given as dilute as 0.25 per cent in distilled water. The solution should be made isotonic with the blood, on account of the well known physiological reactions to hypo- and hyper-tonic injections into the blood stream. The irritating factor of an anisotonic solution, even though it be small, should be eliminated.

The results of more investigation are needed upon the resistance of types of organisms to mercurochrome, gentian violet, and other dyes. In cases of infection where time will allow, in order to spare the patient, the invading organism could be cultivated, and its resistance to the bactericides could be compared *in vitro*.

The unfortunate results should be written up as carefully as the fortunate; and in this new field of investigation necropsy, with detailed necropsy reports, should take a leading role.

8. Churchman, J. W.: Selective Bacterial Action of Gentian Violet. J. Exp. Med., 16, 221, 1912.

9. Churchman, J. W.: Selective Bacteriostatic Action of Gentian Violet and Other Dyes. J. Urol., Jan., 1924.

NEGLECT OF REFRACTION

The importance of accurate correction of refractive errors of vision is a thing much too widely and unwisely neglected by the general practitioner. It is not too much to say that any organ or group of organs in the body may at times be thrown out of physiological balance through the interruption or diminution of normal innervation, due to the wastage of nervous force accompanying the constant strain of the ocular musculature in defective visual acuity.

The normal complex human system is supplied with just so much nervous energy to accomplish a perfect somatic balance. The overwork or strain of a single organ withdraws from normal circulation a varying degree of nervous force, thereby robbing the normal supply of the whole. An innate or temporary weakness or inertia of another organ, no matter how remote, may, by this partial interference with its normal nervous supply, falter in its functioning or even entirely break down, establishing a train of symptoms difficult to trace to the primary source of trouble.

In such obscure cases, and they are many and varied, careful and painstaking investigation of ocular function is seriously demanded. Most physicians recognize this simple fact, it is true, but few of them prosecute their inquiry to a satisfying conclusion.

It is not enough to ask the patient if the eyes have ever been examined. It is not enough to see that glasses are being worn, and thereupon to embrace the assumption that ocular dysfunction can be eliminated from consideration. It is not enough to accept the opinion of an optician, or self-styled optometrist, that the visual apparatus is normal, or if abnormal that it has been corrected. It is not even enough that the practitioner instruct the patient to consult "some good oculist and have the eyes straightened out." That is too casual, and no good physician can be a casualist.

Nothing less is enough than explicit direction and reference to an ophthalmologist of good repute who is known to the attending physician as a competent, expert and conscientious refractionist. Unless and until this is done the internist will have about as much information of the real condition of his patient's vision as if he had sent him to a dentist for an antrum examination, a druggist for a urinalysis, a photographer for roentgenologic study, or a chiropodist for an orthopedic opinion.

Officers S. M. A.

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Book Reviews

Basal Metabolism. Determination of the Metabolic Rate in the Practice of Medicine. By John T. King, Jr. 118 pages. Baltimore: Williams & Wilkins Company.

This is a very satisfactory work for the beginner in basal metabolism, as it reviews the history, pharmacology, chemistry and the anatomy of the thyroid gland, the salient facts concerning which may have been forgotten by the physician who has been out of medical school a few years. Various methods of metabolism determination are described simply, and metabolism in hyperthyroidism, hypothyroidism and myxedema, and other conditions is discussed. The subject is well covered in brief, and will be found to answer most of the ordinary questions.

William Crawford Gorgas, His Life and Work. By Marie D. Gorgas and Burton J. Hendrick. Philadelphia and New York: Lea and Febiger, 1925. Cloth, $5.00.

The story of the conversion of the Panama Canal Zone into a place habitable for man is one of the most thrilling romance chapters of medical history. This is a delightfully told personal account of the life of General Gorgas by his wife, Marie Gorgas, and Burton Hendrick. It opens with a description of his early days in the Army at Fort Brown, Texas, where he was put under arrest for dissecting the corpse of a yellow fever patient. It describes his ancestry, youth and college days.

The account of the struggle in Panama with pictures of the illustrious figures who worked there, makes the book not only a life of Gorgas but a valuable history of the conquest over yellow fever and malaria. Physicians and laymen alike will be charmed by this biography of one of the world's greatest sanitarians, who chanced to be a product of the South.

The Diagnosis of Children's Diseases with Special Attention to the Diseases of Infancy. By Professor Dr. E. Feer, Director of the University Children's Clinic, Zurich, Switzerland. Illustrated. 551 pages. Philadelphia and London: J. B. Lippincott Company, Cloth, $7.00.

Most works upon pediatrics aim to describe diseases and pathology under different classifications, and after this instruction to leave the pediatrician to make his own diagnosis. This book is not a very successful attempt to approach from another starting point. Symptoms of disease are chiefly discussed here, and methods of arriving at a diagnosis from the appearance of the child. The text is profusely illustrated with pictures of various disease conditions, with explanations of means for identification of them. The concluding pages deal with the signs accompanying sudden death. No bibliography is included in the edition. The practitioner in children's diseases will readily find more useful textbooks than this.

A Contribution to the Study of Pernicious Anemia and Aplastic Anemia. By Arthur Sheard, M. D. A thesis presented for the degree of Doctor of Medicine in the University of Leeds, December, 1923. New York: Wm. Wood and Co. Cloth, $2.50.

The author defines the term pernicious anemia and discusses the confusion in the literature regarding the diagnosis of the disease. His analysis of 15 cases of pernicious anemia with three autopsies is very thorough, and brings out several points which have not been generally understood. Hyperplasia of the bone marrow, he says, is considered common in anemia, although usually only a small part of the upper shaft of one of the femora is examined. Examination of the tibia, ulna and other bones shows that complete aplasia may exist also.

He offers theories of explanation of the achlorhydria, and other symptoms, and discusses the causes and treatment of aplastic anemia.

His case reports are well worked up and the literature is intelligently reviewed.

Race Hygiene and Heredity. By Herman W. Siemens, M. D. Translated and edited by Lewellys F. Barker, M. D. Illustrated, 176 pages. New York: D. Appleton and Company, 1924.

This is a small monograph by Professor Siemens of Munich, containing suggestions for the betterment of the race, which have aroused considerable comment abroad. After showing that it is the better classes, both economically and intellectually, in whom the birth rate is lowest, Siemens discusses legislation to remedy this. He says that the goal to be aimed at is that limitation of children to fewer than four, shall no longer be advantageous from an economic standpoint. In the chapter on birth polity, inheritance and other laws are described which might effect this. Persons politically and eugenically minded, as well as the medical profession, will be attracted by this treatise.

Handbook of Bacteriology. For Students and Practitioners of Medicine. By Joseph W. Bigger, M. D. (Dublin), F. R. C. P. I., D. P. H., Professor of Bacteriology, University of Dublin; Bacteriologist Botunda Hospital, Sir Patrick Dun's Hospital, and the Royal City of Dublin Hospital; Formerly Professor of Preventive Medicine, Royal College of Surgeons, Ireland, and Pathologist to the Local Government Board, Ireland. 413 pages, illustrated. New York: Wm. Wood and Co. Cloth, $5.00.

Undoubtedly the tendency of many textbooks to contain all the information and theory extant upon the subject selected has drawbacks. The student is obliged to choose for himself out of a mass of material the part to be retained. This is a brief bacteriology which gives the simpler facts of cultural and serological technic, theories of immunity, and reactions of specific organisms, in a style which is pleasant and not synoptical. Every textbook will bear some correction. In this one the recent work upon scarlet fever is omitted. The descriptions of routine methods of identification of microorganisms will be very useful to the student.

Basal Metabolism in Health and Disease. By Eugene F. DuBois, M. D., Medical Director, Russell Sage Institute of Pathology; Associate Professor of Medicine, Cornell University Medical College. 372 pages, illustrated with 79 engravings. Philadelphia and New York: Lea and Febiger, 1924. Cloth, $4.75.

This is a very complete and scholarly work upon basal metabolism. The author takes up the history of the study of respiratory metabolism, the physical principles and gas laws upon which present day systems of metabolism determinations are based, the metabolism of fat, carbohydrate and protein respectively, goes very fully into the facts of normal metabolism, and methods of checking errors in various metabolism apparatus.

Over half the book is then confined strictly to metabolism in disease: in under and over nutritions, in diabetes, in thyroid diseases, in relation to the adrenal, pituitary and sex glands, in blood diseases, in diseases of the heart and kidneys, in fever, in water metabolism, in diseases of the nervous system, and a chapter is devoted to the effect of drugs upon basal metabolism.

It is a very valuable text book for those who are doing basal metabolism determinations, and for those engaged in diagnostic work who have metabolism determinations done on their patients.

Heredity in Nervous and Mental Diseases. An Investigation by the Association for Research in Nervous and Mental Disease. Report of the Papers and Discussions at the Meeting of the Association; New York City, December 27 and 28, 1923. 332 pages. New York: Paul B. Hoeber, Inc., 1925. Cloth, $3.75 net.

The authors are too well informed to pretend to have come to definite conclusions as to the inheritance of many nervous or mental diseases. In very good type are printed the most recent researches upon the subject, starting with a general consideration of the proven biological facts of the role of the cell and the chromosomes, and exogenous and endogenous factors in heredity.

The pathological aspects of heredity in nervous diseases are considered, in the nervous system, in the extraneural system, and in experimental degeneracy. Heredity in the psychoses, and heredity in literature are considered largely from a statistical viewpoint. The effect of lack of oxygen, of alcoholic parentage, and other factors upon the development of the embryo in experimental animals throws considerable light upon heredity of defects in general; and further experiments of the kind will doubtless greatly clarify current conceptions. This book will appeal particularly to the psychiatrist, neurologist and those who are attracted by experimental biology.

A Text-Book of Pathology. By William G. MacCallum, M. D., Professor of Pathology and Bacteriology, Johns Hopkins University. Third Edition, thoroughly revised. Octavo volume of 1162 pages with 575 original illustrations. Philadelphia and London: W. B. Saunders Company, 1924. Cloth, $10.00 net.

Assuming that all pathology is the immediate or remote reaction to some cell injury, MacCallum deals successively with types of injury and effect, where the cause of the reaction is known. Tumors can not come under known etiology at present, and are considered separately in the last 200 pages of the work.

Disturbances of body fluids are taken up, the structure and metabolism of cells, disturbance of various forms of metabolism, bodily defences, inflammatory reactions, reaction to physical and chemical injuries, to bacterial invasion and other infection, injuries to the blood and blood forming organs, to the organs of internal secretion, giving the pathology of the islands of Langerhans in diabetes, and bone injuries, etc.

Dr. MacCallum is one of the greatest of living pathologists. His text book is needed by every medical student and in every physician's reference library.

The Medical Clinics of North America (Issued Serially, one number every month). Volume VIII, Number IV, (Mayo Clinic Number, January, 1925). Octavo of 374 pages with 66 illustrations. Per clinic year (July, 1924, to May, 1925). Philadelphia and London: W. B. Saunders Company, 1925. Paper, $12.00; Cloth, $16.00.

The subject matter of this volume is so divided as to offer something of interest upon a large number of timely topics, as for example, tubal inflation in sterility, functional tests in study of the liver, pyloric obstruction from swallowing lye, iodin in the treatment of goiter, cases of pernicious anemia combined with diabetes, basal metabolic rate in primary cardiac disease, and others.

It well reflects the diversified and thorough study of the Mayo group.

Southern Medical News

ALABAMA

The Alabama State Medical Association will hold its annual meeting in Birmingham, April 21-24, under the Presidency of Dr. J. D. Heacock, of Birmingham. The following out-of-state physicians are on the program to present papers: Dr. C. C. Bass, New Orleans, La.; Dr. Mack Rogers, Dwight, Ill.; Dr. Chas. H. Cocke, Asheville, N. C.; Dr. Geo. J. Heuer, Cincinnati, Ohio; Dr. Thomas R. Brown, Baltimore, Md.; Dr. Roger S. Morris, Cincinnati, Ohio; Dr. T. R. Harrison, Baltimore, Md.; Dr. Olin West, Chicago, Ill.; Dr. Isaac A. Abt, Chicago, Ill.; Dr. Henry W. Cook, Minneapolis, Minn.; Dr. Hubert A. Royster, Raleigh, N. C.; and Maj. Austin J. Canning, Fort McPherson, Ga.

Dr. W. M. Jordan, formerly of Birmingham, has located at Miami, Fla.

The American College of Surgeons held their annual meeting in Mobile February 13-14. Dr. J. C. Willis, Shreveport, La., was elected Chairman; Dr. C. G. Cole, Secretary; Dr. J. Q. Graves, Monroe, La., Councilor. The next meeting will be held in New Orleans.

Sixty cases of smallpox were reported in Calhoun County January 30. Most of them were negroes.

Deaths

Dr. John Thomas Striplin, Roanoke, aged 53, died January 21.

Dr. Daniel Williams Box, Vernon, aged 65, died January 15 in Birmingham.

Dr. Phocian B. Lusk, Guntersville, aged 58, died in January.

ARKANSAS

The Arkansas State Medical Association will hold its annual meeting in Hot Springs, May 13-15.

St. Francis Medical Society has elected Dr. J. F. McDougal, President; Dr. A. B. Caldwell, Vice-President; Dr. J. O. Rush, Secretary-Treasurer.

The Council of the Arkansas Medical Society held its midwinter session December 17, Little Rock.

The Pulaski County Medical Society, Little Rock, will establish a physicians' credit bureau, which will assemble and distribute to members information pertaining to persons who apparently are wilfully delinquent in paying for medical services.

The State Health Officer says the outbreak of influenza in the state is the most serious since 1921.

A bill introduced into the state legislature by Representative Lewis provides for a board of medical examiners to be composed of four regular physicians, two eclectics and one homeopath. All applicants for license would be graduates of a legally incorporated medical college or institution who made a general average in their studies of at least 75 per cent and received not less than 50 per cent in any subject.

The Craighead County Medical Society held its regular meeting recently in Jonesboro. The meeting was for the entertainment of the doctors and their wives, the hosts being Drs. Homer A. Stroud and Herbert H. McAdams. Dr. J. H. McCurry is President of the Society, and Dr. Thad Cothern is Secretary.

Dr. E. T. Ponder has been elected as Consulting Nerologist on the staff of the Baptist State Hospital Clinic.

Dr. R. L. Saxon, Little Rock, is President of Wonder State Manufacturing Company.

Dr. Louis L. Marshall, Little Rock, has been appointed a member of the State Board of Health succeeding Dr. Henry L. Montgomery, Gravelly, whose term expired.

Dr. J. P. Runyan and Dr. Robert Caldwell have been elected Vice-Presidents of the Federal Bank and Trust Company, being organized in Little Rock.

Dr. R. Q. Patterson, Little Rock, was recently appointed Chief Medical Director for the Arkansas State Mutual Insurance Company.

Dr. Hugh O. Turrentine, Little Rock, has been appointed head of one of the Near East Relief orphanages and asylums in Southern Russia. The appointment is for two years.

Dr. J. R. Linzy, Russellville, has been elected Physician to the Confederate Home. He will continue his work as State Medical Director for the Modern Woodmen of America.

Deaths

Dr. Patrick Henry Keeter, Flippin, aged 43, died January 21 from pneumonia.

Dr. Verne Richard Stover, Batesville, aged 46, died recently at Eureka Springs, from cerebral hemorrhage.

Dr. Richard Henderson Taylor, Hot Springs, aged 87, died January 19.

DISTRICT OF COLUMBIA

Deaths

Dr. George P. Lumsden, Washington, aged 71, died in January from heart disease.

Dr. John Thomas Cole, Washington, aged 68, died in February.

Dr. Fred Kimball Swett, Washington, aged 67, died January 10 following a long illness.

Dr. Frederick Michael Nolan, Washington, aged 34, died January 13 at the U. S. Veterans' Hospital, Oteen, N. C.

Dr. Charles B. Byrne, Col., U. S. Army, retired, Washington, aged 78, died November 24 at the Walter Reed General Hospital from arteriosclerosis.

FLORIDA

Deaths

Dr. William Williams MacDonell, Jacksonville, aged 43, died January 18.

Dr. Carson Jefferson Lewis, South Jacksonville, aged 35, died January 11 at St. Luke's Hospital.

Dr. Ellis Phillips, Jacksonville, aged 81, died January 4 at Columbus, Ohio.

GEORGIA

The Georgia State Medical Association will hold its annual meeting in Atlanta, May 13-15.

Fulton County Medical Society has elected Dr. Theodore Toepel, Atlanta, President; Dr. J. L. Campbell, Atlanta, Vice-President; Dr. Grady E. Clay, Atlanta, Secretary-Treasurer.

Sixth District Medical Society met in Macon December 8. Dr. T. E. Rogers, Macon, was elected President; Dr. Kenneth Hunt, Griffin, Vice-President; Dr. T. I. Hawkins, Griffin, Secretary-Treasurer.

Athens General Hospital, Athens, has been taken over by Clarke County. The County purchased this from the recent sale of $200,000 worth of bonds. The citizens voted $50,000 worth of bonds for construction and maintenance of a tuberculosis hospital.

The Coastal Plain Hospital, Tifton, recently destroyed by fire, has been reopened in the Jesup Home.

The Vidalia Hospital, operated by Dr. T. C. Thompson, Vidalia, has been enlarged. It is now equipped with an x-ray, sterilizers, laboratory, etc.

The contract has been let for the contagious disease unit of Grady Hospital, Atlanta. The building will cost $50,000.

The City Hospital of Brunswick is the recipient of $5,000 bequeathed by the late Major C. Downing, Brunswick. The money will be held in trust until the Board of Commissioners decide on a suitable memorial to Major Downing.

The John D. Archbold Memorial Hospital, Thomasville, will soon be completed.

At the recent session of the General Assembly a bill was endorsed appropriating $5,000 to the Georgia State Board of Health to aid in Maternity and Infant Hygiene. The Federal appropriation amounts to $5,000, making a total of $10,000 for this work.

At the recent annual election, Dr. Frank L. Eskridge was elected President of the White Unit of the Grady Memorial Hospital, Atlanta; Dr. Montague L. Boyd, Vice-President; Dr. William H. Hailey, Secretary-Treasurer.

Dr. E. R. Anthony, Jr., Griffin, is now in the U. S. Public Health Service and stationed at Fort Stanton, New Mexico.

Dr. Howard E. Felton has been reelected Commissioner of Health for Bartow County for a term of four years.

Dr. Maxwell Harbin, Rome, has accepted the appointment as Professor of Orthopedic Surgery at Western Reserve University and Orthopedic Surgeon to Lakeside and Rainbow Hospitals, Cleveland, Ohio.

Deaths

Dr. William J. Jennings, Thomasville, aged 51, died January 6 from angina pectoris.

Dr. H. W. Davis, August, died January 16 in Atlanta, from pneumonia.

(Continued on page 34)4

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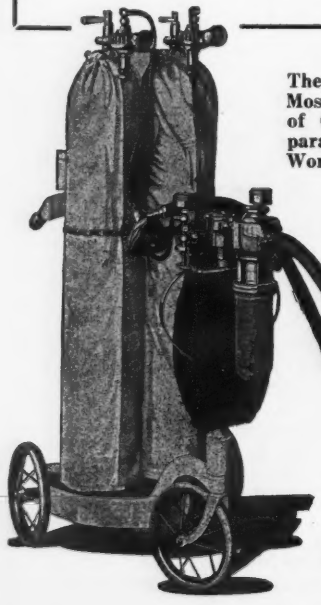

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(Continued from page 314)

Dr. Robert W. Trotter, Madison, aged 68, died January 16.

Dr. William D. Martin, Alpharetta, aged 44, died January 14.

Dr. William S. Howard, Griffin, aged 42, was instantly killed January 14 in a railway accident.

Dr. Charles Regulus Mann, Perry, aged 76, died January 24.

Dr. Harry Hand McGee, Savannah, aged 55, died January 7 from carcinoma of the liver.

Dr. Jefferson D. Bradley, Kingston, aged 63, died January 13 from angina pectoris.

KENTUCKY

The Methodist Episcopal Church, South, has taken over the Good Samaritan Hospital, Lexington.

A Shriners' Crippled Children's Hospital is being erected at Louisville at a cost of $200,000.

Dr. Lee P. Molloy has been elected President of the McCracken County Board of Health, and Dr. Oliver R. Kidd, Secretary.

Dr. Paul B. Hall, Paintsville, was recently appointed Health Officer of Johnson County.

Dr. E. N. Hall has been presented with a radio by his fellow practitioners of Warren County. Dr. Hall retired from active practice several years ago when stricken with paralysis.

Dr. Joseph H. Hopper, Springfield, who has been Secretary-Treasurer of the Washington County Medical Society for twenty years, was given a banquet by physicians of the county, January 14, in recognition of long and faithful service. Because of ill health, Dr. Hopper has not been in active practice for several years, but is planning to enter practice again.

Dr. Waller O. Bullock has been reelected President of the Board of Health of Lexington.

Dr. Joseph E. Wells, Cynthiana, was recently reelected President of the State Board of Health.

Dr. Robert M. Hathaway, Farmer City, Ill., has been appointed Director of the Daviess County Health Department, succeeding Dr. G. W. Duvall, who resigned.

The following physicians were recently appointed members of the Warren County Board of Health: Charles E. Francis, Will C. Strother, Bowling Green, and Walter C. Simmons, Smith Grove.

Dr. J. E. Rush, Professor and head of the Department of Hygiene and Public Health, University of Louisville, has been elected to membership in the Royal Institute of Public Health, London.

Dr. Gordon B. Carr and Miss Justine Marquardt, both of Sturgis, were married January 10.

Deaths

Dr. Albert William Carpenter, Owensboro, aged 73, died February 3.

Dr. Robert Louis Finnell, Verona, aged 80, died January 5 from heart disease.

Dr. Sol A. Steinberg, Louisville, aged 36, died January 14.

Dr. James Taylor Dorsey, Lexington, aged 48, died January 23 at St. Joseph's Hospital, from uremia.

Dr. Isaac A. Lederman, Louisville, aged 51, died February 7.

Dr. Marvin Jackson Kingings, Hazard, aged 28, died February 7.

LOUISIANA

The Louisiana State Medical Association will hold its annual meeting in New Orleans, April 21-23.

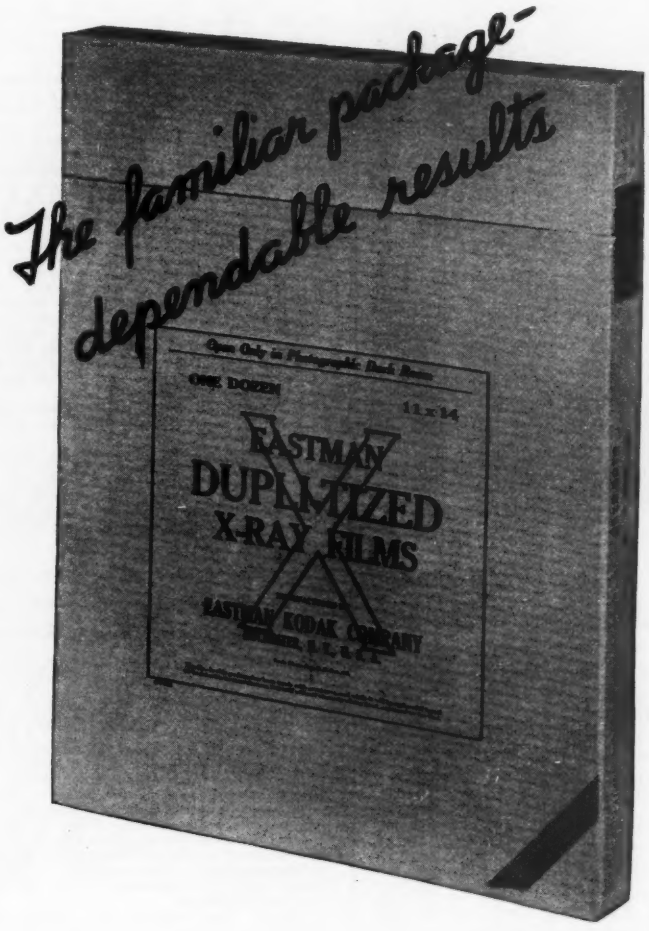
Calcasieu Parish Medical Society has elected Dr. Louis A. Hebert, Lake Charles, President; Dr. Geo. S. Kreeger, Lake Charles, Vice-President; Dr. Louis K. Kushner, Lake Charles, Secretary-Treasurer.

Claiborne Parish Medical Society has elected Dr. J. A. Wilkinson, Homer, President; Dr. Henry Baucum, Haynesville, Vice-President; Dr. E. B. Middleton, Homer, Secretary-Treasurer.

Lafayette Parish Medical Society has elected Dr. Eric Guibeau, Carencro, President; Dr. M. M. Mouton, Lafayette, Vice-President; Dr. H. G. F. Edwards, Lafayette, Secretary-Treasurer.

Lafourche Valley Medical Society was the guest of the Lafourche Parish Medical Society in Thibodaux on February 12. Dr. J. J. Ayo, Raceland, was elected President; Dr. W. Pugh, Napoleonville, Vice-President; Dr. Philip Dansereau, Secretary-Treasurer.

(Continued on page 36)



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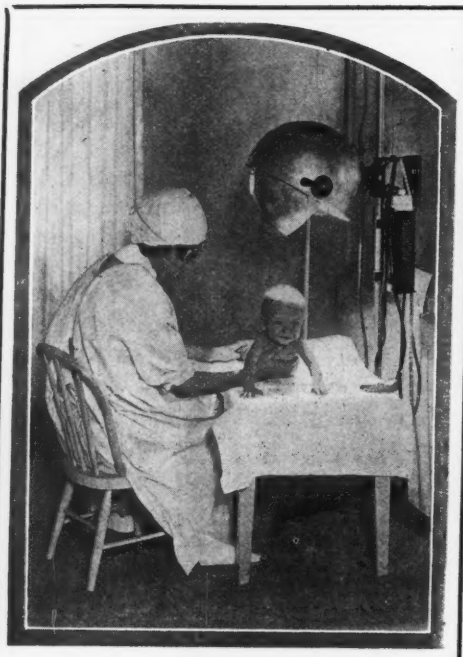

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(Continued from page 34)

St. Martin Parish Medical Society has elected Dr. S. D. Yongue, Breaux Bridge, President; Dr. C. W. Boring, Breaux Bridge, Vice-President; Dr. P. H. Fleming, St. Martinville, Secretary-Treasurer.

St. Mary Parish Medical Society has elected Dr. Homer Gates, Franklin, President; Dr. A. C. Kappel, Franklin, Secretary-Treasurer.

Third District Medical Society was entertained by the Franklin medical profession at Franklin, January 28. Dr. C. M. Horton, Franklin, was elected President; Dr. P. A. Boykin, Jeanerette, Vice-President; Dr. H. G. F. Edwards, Lafayette, Secretary-Treasurer.

Tri-State Medical Society of Arkansas, Louisiana and Texas met in Shreveport January 14-15. The following officers were elected: Dr. J. A. Hendrick, Shreveport, President; Drs. H. C. Iron, Benton, La., R. Y. Phillips, Malvern, Ark., Chas. R. Carter, Dallas, Tex., Vice-Presidents; Dr. Frank H. Walke, Shreveport, reelected Secretary. The next meeting will be held in Marshall, Tex.

The first staff meeting of the Shreveport Charity Hospital was held in Shreveport, January 20, under the superintendency of Dr. J. M. Moseley. Dr. Moseley announced the reappointment of the previous chiefs of the different departments, and also the appointment of Dr. Willis P. Butler as Pathologist. Dr. J. E. Knighton was selected temporary Chairman of the Staff; Dr. J. E. Heard was elected Secretary. A committee consisting of Drs. Barrow, Garrett and Herold was appointed to draw up an outline of procedure for the regular meetings.

The report of plague eradicative measures for the week ending January 10 shows 4,133 rodents examined at New Orleans, none of which were infected. Out of a total of 13,755 rodents examined up to that date only five were found to be infected.

Dr. Charles H. Potts has been appointed House Surgeon of the Shreveport Charity Hospital, succeeding Dr. C. F. Lambert.

Dr. Arthur Vidrine and Miss Kathleen Miazza, both of New Orleans, were married October 28.

Dr. Aynaud Foster Hebert and Miss Marguerite Anne Hartson, both of New Orleans, were married October 22.

Dr. Edwin August Socola and Miss Bessie Wailes Magruder, both of New Orleans, were married recently.

Deaths

Dr. Paul Michinard, New Orleans, aged 67, died February 10.

Dr. George Edgar Butchee, Oakdale, aged 58, died January 5, following a long illness.

Dr. William Matthew Adams, Shreveport, aged 48, died January 30.

Dr. John B. Hart, New Orleans, died February 9.

Dr. Pierre Albert Moore, New Orleans, died February 11.

MARYLAND

Dr. Joseph C. Bloodgood, of Baltimore, has returned from a four-months recreation visit to Egypt.

The Medical and Chirurgical Faculty of Maryland will hold its annual meeting in Baltimore April 28-30.

The control of the Bulletin of the Johns Hopkins Hospital has passed to the Medical School. The publication in the future will be in charge of an editorial board chosen among the members of the faculty. The Bulletin will continue to appear monthly. Correspondence relating to all business details should be addressed to the publishers, Williams and Wilkins, Baltimore.

Wilmer Eye Institute at Johns Hopkins University, Baltimore, has received from Mr. J. P. Morgan, New York, a gift of $100,000. The amount yet to be raised is $500,000. The date on which the total sum, $3,000,000, needed to assure the establishment of the institute must be raised, was extended to February 15. The President of Johns Hopkins announced on that date that the entire amount had been subscribed. Among other large gifts to this fund were $50,000 each from Frank A. Munsey, Julius Rosenwald and Felix Warburg.

The new $300,000 addition to the Bon Secours Hospital, Baltimore, was formally opened January 15. The original building, erected in 1917, together with the new addition, was the gift of Mr. and Mrs. George C. Jenkins to the Sisters of Bon Secours.

A safety conference was held at Baltimore January 23 under the joint auspices of the Baltimore Safety Council and the American Society of Safety Engineers. More than 200 industrial engineers and executives attended the conference.

(Continued on page 38)

Putting Mother's Milk in Baby's Bottle

COW'S MILK contains a much higher percentage of casein than mother's milk because nature intended it for the powerful digestive ability of the calf.

On the other hand, mother's milk contains a lesser percentage of casein and a much higher percentage of lacto-albuminoid—nature's protective colloid which enables the delicate infant organisms to easily digest and assimilate all the nourishment.

When cow's milk is fed to the infant, modification is necessary to make it more nearly correspond to mother's milk.

First among the available colloids is pure, plain gelatine. (Zsigmondy, Z Anal. Chem. 40, 1901). When 1% of Knox Sparkling Gelatine, completely dissolved, is added to the prescribed milk formula, the curdling of the casein by the enzyme acids of the gastric juice is prevented, and the nourishment obtainable from the milk is increased by about 23%. It is just like putting mother's milk in the nursing bottle.

Here is the most approved method of modifying baby's milk with gelatine:

Soak for ten minutes one level tablespoonful of Knox Sparkling Gelatine in ½ cup of cold milk taken from the baby's formula; cover while soaking; then place the cup in boiling water, stirring until gelatine is fully dissolved; add this dissolved gelatine to the regular formula.

For children and adults follow the same method in the proportion of ½ teaspoonful of gelatine to a glass of milk. Because of its purity, it is essential to specify Knox Sparkling Gelatine.

A package of Knox Sparkling Gelatine, together with the physician's reference book of nutritional diets, will be sent free, upon request, if you will address the Charles B. Knox Gelatine Laboratories, 408 Knox Ave., Johnstown, New York.

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To be rubbed into scalp every other day.

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(Continued from page 36)

Dr. John Lanahan Dorsey and Miss Gertrude Allen Dixon, both of Baltimore, were married January 31.

Deaths

Dr. Edward M. Singewald, Baltimore, aged 56, died February 10.

Dr. Hamlet Jarvis, Elkridge, aged 69, died January 31.

MISSISSIPPI

The Mississippi State Medical Association will hold its annual meeting in Biloxi May 12-14. President H. M. Folkes, of the Harrison-Stone County Medical Society, advises that headquarters will be at the Avelez Hotel.

Dr. James B. Black, Jr., formerly Health Officer for Lee County, has been transferred to Jackson to organize a health unit in Hinds County.

Dr. Robert A. Clanton, County Health Officer for Grenada, has resigned. Dr. Thomas J. Brown has been appointed to succeed him.

Dr. Edley Hicks Jones, Vicksburg, and Miss Anne Tupper Jiggitts, Canton, were married November 19.

Deaths

Dr. Edward C. Coleman, Kosciusko, aged 69, died December 30.

Dr. W. E. Tillman, Graysport, aged 71, died January 2.

MISSOURI

Missouri State Medical Association will hold its annual meeting in Kansas City May 5-8.

Boone County Medical Society has elected Dr. Dudley S. Conley, Columbia, President; Dr. A. W. Kampschmidt, Columbia, Vice-President; Dr. Wm. O. Fischer, Columbia, Secretary-Treasurer.

Cass County Medical Society has elected Dr. H. A. Brierly, Peculiar, President; Dr. R. M. Miller, Belton, Vice-President; Dr. W. L. Viers, Pleasant Hill, Secretary.

(Continued on page 40)

THE PHYSIATRIC INSTITUTE

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Devoted to the treatment and scientific investigation of metabolic disorders, especially diabetes, nephritis, hypertension and obesity.

Diabetes

The milder cases are still treated by diet without insulin. An accurate balanced diet is still necessary in the severe cases which receive insulin. Wrong or careless diet methods will give many bad results, which should not be blamed upon insulin. Institutional care is often important for study of the condition, breaking of wrong habits and instruction in diet. This Institute specializes in the individualized study and instruction of patients.

Nephritis and High Blood Pressure

The benefits of laboratory study and dietary control of nephritis are well recognized. The Institute is equipped for administering this standard treatment. The therapy of hypertension, whether pure or associated with nephritis, is generally regarded as unsatisfactory. The diet treatment used in this Institute is different from the ordinary, and is believed to be more successful. Though early or mild cases are naturally most promising for prophylaxis and for complete return to normal, it is possible in the majority of advanced cases to obtain marked and long-lasting benefits in the form of reduction of pressure and relief of symptoms. Physicians are invited to refer cases to the Institute for proof of this statement.

Obesity

The Institute offers treatment for any kind or degree of obesity. When the patient is willing to cooperate reasonably in diet, any desired reduction of weight can ordinarily be accomplished without danger and without serious privation. This statement applies also to the so-called endocrine type of obesity.

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(Continued from page 38)

Clay County Medical Society has elected Dr. J. E. Baird, Excelsior Springs, President; Dr. W. L. Wysong, Liberty, Vice-President; Dr. J. J. Gaines, Excelsior Springs, Secretary-Treasurer.

Howell-Oregon County Medical Society has elected Dr. J. L. Eblen, Alton, President; Dr. E. C. Bohrer, West Plains, Vice-President; Dr. F. A. Barnes, Thayer, Secretary-Treasurer.

Miller County Medical Society has elected Dr. D. H. Kouns, Tuscumbia, President; Dr. W. L. Allee, Eldon, Vice-President; Dr. E. C. Shelton, Eldon, Secretary.

Mississippi County Medical Society has elected Dr. S. P. Martin, East Prairie, President; Dr. James R. Lee, Charleston, Vice-President; Dr. H. L. Reid, Charleston, Secretary-Treasurer.

Pulaski County Medical Society has elected Dr. C. A. Talbot, Dixon, President; Dr. W. J. Sell, Crocker, Vice-President; Dr. E. A. Oliver, Richland, Secretary-Treasurer.

Ray County Medical Society has elected Dr. Grover W. Gains, Rayville, President; Dr. Marvin Grimes, Hardin, Vice-President; Dr. R. L. Hamilton, Richmond, Secretary; Dr. T. F. Cook, Richmond, Treasurer.

The fifth meeting of the Medical Society of the Assistant Physicians of the Missouri State Hospitals was held at State Hospital No. 1, Fulton, December 10.

Greene County Womans' Auxiliary was recently organized.

The Woman's Auxiliary of Lafayette County was organized at Lexington January 13. The following officers were elected: Mrs. C. T. Ryland, Lexington, President; Mrs. R. B. Watts, Wellington, Mrs. D. C. Davis, Higginsville, Mrs. R. C. Schooley, Odessa, Vice-Presidents; Mrs. A. J. Chalkley, Lexington, Secretary; Mrs. Lewis Carthrae, Jr., Corder, Treasurer.

The new Freeman Memorial Hospital, Joplin, was formally opened March 1. It is modernly equipped and will care for fifty patients.

St. Luke's Hospital, Kansas City, has established a clinic in connection with the hospital work, to be conducted under the supervision of the medical staff. Mrs. Woodstock do-

(Continued on page 42)

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Made in the United States in strict conformity with Ehrlich's processes and formulas. Government tested.

Our obligation of responsible helpfulness towards practitioner and patient is being fulfilled through the medium of lowered prices of Neosalvarsan possible by quantity production.

I.	0.15 gram	$.60 per ampule
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(Continued from page 40)

nated the funds for the clinic in memory of her husband, S. E. Woodstock.

Deaths

Dr. Amos Abraham Freymann, Kansas City, aged 72, died January 15 at St. Joseph's Hospital from pneumonia.

Dr. William Frank Meyer, St. Louis, aged 44, died January 5.

Dr. George Boemler, St. Louis, aged 83, died January 12.

Dr. Charles Anderson Pope Dunnavant, Kirkwood, aged 69, died January 30.

Dr. Thomas J. Baskett, Fulton, aged 84, died January 7.

Dr. Charles Herbert Gerhard, Kirkwood, aged 49, died in November.

Dr. Wilson M. Lenox, Hobson, aged 81, died January 12 following a long illness.

Dr. William L. Gillmor, Mount Washington, aged 59, died February 2 of injuries received when the automobile in which he was driving was struck by a train.

Dr. James S. Rogers, Sedalia, aged 81, died suddenly January 26 from heart disease.

Dr. William Henry Erckert, St. Louis, aged 60, died January 17 from cerebral hemorrhage.

Dr. Robert Smith Spears, Westplains, aged 58, died January 17.

NORTH CAROLINA

The North Carolina State Medical Association will hold its annual meeting in Pinehurst April 28-30.

Raleigh Academy of Medicine, Raleigh, has elected Dr. J. W. McGee, Jr., President; Dr. Hugh A. Thompson, Secretary; Dr. Henry M. Bonner, Treasurer.

A bill to repeal the law which prohibits a white nurse from caring for negro patients has been reported favorably by the senate committee.

A bill has been introduced in the house that would permit insurance policies up to $2,000 to be issued in this state without a physical examination. An amendment to the bill is to the effect that where there is no medical examination, the policy shall not be rendered void on account of physical condition of the applicant except in cases of fraud.

(Continued on page 44)

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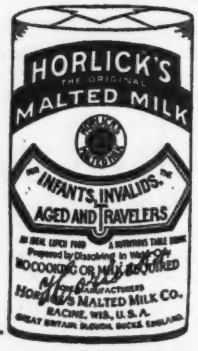

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Any *good* culture will do the work, but B. B. CULTURE possesses several unique features which appeal strongly to the discriminating physician.

May we submit literature and samples for clinical tests?

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THIS generator is constructed to adequately care for all Radiography (including the newer high milliampere technique), Fluoroscopy and Therapy up to 150 kilovolts. Among its many exclusive features are:

The Coronaless Rectifier embodying sphere gap characteristics by means of which all corona is eliminated.

Remote control stand containing all meters, controls and timer.

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Maximum of useful X-Rays produced.

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This fact is an assurance to the purchaser that his apparatus will continue to give him the maximum in service and satisfaction at all times regardless of possible developments in the art.

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(Continued from page 42)

Dr. Watson S. Rankin, Raleigh, was recently elected a member of the executive committee, Board of Trustees of Wake Forest College.

Dr. Morgan P. Moorer, Health Officer of Buncombe County, has resigned on account of ill health.

Dr. Gideon H. Macon, Warrenton, has been elected County Health Officer of Warren County.

Dr. Robert D. Jones, Newbern, was recently appointed a Fellow in Surgery at the Mayo Clinic for a term of three years.

Dr. T. F. Costner, Lumberton, is the new medical director of the LaFayette Life Insurance Company.

Dr. William E. Warren, Williamstown, was recently re-elected County Physician of Martin County.

Dr. Charles Daligny, Troy, was recently reelected County Health Officer of Montgomery County.

Dr. Lemuel Remond Broome, Kinston, and Miss Dorothy Dawson Houchens, Charlottesville, Va., were married January 20.

Deaths

Dr. Marshall Hall Fletcher, Asheville, aged 66, died January 30.

Dr. John Walter Jones, Boone, aged 48, died January 14 at a hospital in Knoxville, Tenn., from pneumonia.

Dr. Henry Spencer Moore, New Bern, aged 46, died October 1.

Dr. Arthur Wesley Greene, Ahoskie, aged 47, died February 4 at St. Vincent's Hospital, Norfolk, Va., after a month's illness.

Dr. Gilbert McLeod, Carthage, aged 68, died February 1, after an illness of two years.

OKLAHOMA

The Oklahoma State Medical Association will hold its annual meeting in Tulsa May 12-14.

The Oklahoma County Medical Society gave its annual banquet January 17, in honor of its new President, Dr. Harry Coulter Todd. The Oklahoma County dentists and their wives were guests of the Society.

The Board of Education, Oklahoma City, has requested the Oklahoma County Medical Association to appoint an advisory committee from its members to supervise the assignment of cases to various orthopedic surgeons in the city, at the School for Crippled Children, when requested to do so by the parents or guardians. Drs. H. Marion Williams, George R. Tabor and Carroll M. Pounders have been appointed on the committee.

Dr. Eli Hughes, Stillwater, has been appointed City Health Officer.

Deaths

Dr. Robert Goodman Bloomfield, Oklahoma City, aged 64, died December 23 at the University Hospital.

Dr. Moses Milton Bumgartner, Goodwell, aged 50, died December 19.

Dr. Samuel Ellsworth Gayman, Britton, aged 58, died January 23 at a hospital in Oklahoma City.

SOUTH CAROLINA

The South Carolina State Medical Association will hold its annual meeting in Spartanburg, April 21-23.

(Continued on page 46)

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A refined Christian home for the care and protection of unfortunate girls during pregnancy and confinement.

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(Continued from page 44)

Allendale County Medical Society has elected Dr. W. H. Breeland, Allendale, President; Dr. W. R. Tuten, Fairfax, Vice-President; Dr. J. E. Warnock, Allendale, Secretary-Treasurer.

Laurens County Medical Society has elected Dr. J. M. Bearden, President; Drs. J. L. Donnan and W. D. Ferguson, Vice-Presidents; Dr. J. L. Fennel, Secretary-Treasurer.

The Spartanburg County Medical Society had a banquet on February 13, at which time several distinguished guests were on the program of speakers. The woman's Auxiliary of the Spartanburg County Medical Society was organized. Mrs. L. J. Blake was elected President; Mrs. W. A. Wallace, Vice-President; Mrs. Baxter Haynes, Secretary-Treasurer.

Deaths

Dr. Richard Edwin Thompson, Anderson, aged 83, died January 6 from pneumonia.

Dr. James B. Black, Bamberg, aged 75, died January 9 from heart disease.

Dr. Robert Harllie Pearce, Claussen, aged 57, died January 1 from heart disease.

Dr. Clarence Franklin Strother, Johnston, aged 69, died December 25 from heart disease.

TENNESSEE

The Tennessee State Medical Association has changed the date of its annual meeting from April 14-16 to April 21-23. The meeting will be held in Nashville.

Anderson County Medical Society has elected Dr. J. M. Cox, Coal Creek, President; Dr. W. L. Carden, Andersonville, Vice-President; Dr. J. S. Hall, Clinton, Secetary-Treasurer.

Bedford County Medical Society has elected Dr. B. L. Burdett, Shelbyville, President; Dr. M. L. Connell, Wartrace, Vice-President; Dr. W. H. Avery, Secretary-Treasurer.

Blount County Medical Society has elected Dr. J. Walter McMahan, Alcoa, President; Dr. C. F. Crowder, Maryville, Vice-President; Dr. F. A. Zoller, Maryville, Secretary.

(Continued on page 48)

Tonic Arsenic Therapy
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Superior to cacodylates because of greater uniformity and reliability of action. Despite its high arsenic percentage is virtually non-toxic in medicinal doses.

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RIGID inspection guarantees the razor sharpness of Bard-Parker blades. The blades are first subjected to the "Hair Test" which requires that each blade must cut a suspended hair.

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BARD-PARKER COMPANY, INC.
150 Lafayette Street. New York. N.Y.

(Continued from page 46)

Bradley County Medical Society has elected Dr. R. L. Bean, Cleveland, President; Dr. J. F. Gilbert, Cleveland, Vice-President; Dr. H. W. Harris, Cleveland, Secretary-Treasurer.

Campbell County Medical Society has elected Dr. George B. Brown, Jellico, President; Dr. William Gaylor, Jellico, Vice-President; Dr. F. A. McClintock, Newcomb, Secretary-Treasurer.

Chattanooga Academy of Medicine and Hamilton County Medical Society has elected Dr. L. T. Stem, Chattanooga, President; Dr. W. W. Marchbanks, Chattanooga, Vice-President; Dr. Wm. Dulaney Anderson, Chattanooga, Secretary-Treasurer.

Davidson County and Nashville Academy of Medicine has elected Dr. Charles N. Cowden, President; Dr. Eugene K. Orr, Vice-President; Dr. Robert R. Brown, Secretary-Treasurer.

Grundy County Medical Society has elected Dr. W. P. Stone, Tracy City, President; Dr. C. W. Hembree, Palmer, Vice-President; Dr. E. C. Lindsey, Secretary-Treasurer.

Hamblen County Medical Society has elected Dr. W. G. Ruble, Morristown, President; Dr. P. L. Henderson, Morristown, Vice-President; Dr. C. T. Carroll, Morristown, Secretary-Treasurer.

Jackson County Medical Society has elected Dr. L. R. Anderson, Gainesboro, President; Dr. N. M. McCoin, Gainesboro, Vice-President; Dr. R. C. Gaw, Gainesboro, Secretary.

Lauderdale County Medical Society has elected Dr. J. R. Lewis, Ripley, President; Dr. T. E. Miller, Ripley, Vice-President; Dr. W. V. Sanford, Ripley, Secretary-Treasurer.

Loudon County Medical Society has elected Dr. T. J. Hickman, Lenoir City, President; Dr. Halbert Robinson, Loudon, Vice-President; Dr. J. G. Eblen, Lenoir City, Secretary-Treasurer.

Madison County Medical Society has elected Dr. B. C. Arnold, Jackson, President; Dr. J. L. Field, Jackson, Vice-President; Dr. R. B. White, Jackson, Secretary-Treasurer.

Maury County Medical Society has elected Dr. H. O. Anderson, Williamsport, President; Dr. R. S. Perry, Columbia, and Dr. W. E. Black, Columbia, Vice-Presidents; Dr. W. K. Sheddan, Columbia, Secretary-Treasurer.

Monroe County Medical Society has elected Dr. S. N. Penland, Madisonville, President; Dr. T. M. Roberts, Sweetwater, Vice-President; Dr. B. W. Bagwell, Madisonville, Secretary.

Polk County Medical Society has elected Dr. C. W. Strauss, Copperhill, President; Dr. F. M. Kimsey, Ducktown, Vice-President; Dr. F. O. Geisler, Isabella, Secretary-Treasurer.

Roane County Medical Society has elected Dr. T. L. Smith, Rockwood, President; Dr. J. J. Waller, Oliver Springs, Vice-President; Dr. W. W. Hill, Harriman, Secretary-Treasurer.

Rutherford County Medical Society has elected Dr. V. S. Campbell, Murfreesboro, President; Dr. B. L. Ousley, Christiana, Vice-President; Dr. J. A. Scott, Secretary-Treasurer.

Smith County Medical Society has elected Dr. R. E. Garrett, Dixon Springs, President; Dr. W. B. Dalton, Gordonsville, Vice-President; Dr. B. J. High, Elmwood, Secretary-Treasurer.

Weakley County Medical Society has elected Dr. W. W. McBride, Gleason, President; Dr. J. A. Moore, Sharon, Vice-President; Dr. G. C. Thomas, Greenfield, Secretary-Treasurer.

White County Medical Society has elected Dr. S. E. Gaines, Sparta, President; Dr. W. L. Brock, Sparta, Vice-President; Dr. A. F. Richards, Sparta, Secretary-Treasurer.

Williamson County Medical Society has elected Dr. L. M. Graves, Franklin, President; Dr. Dan German, Franklin, Vice-President; Dr. K. S. Howlett, Franklin, Secretary-Treasurer.

Wilson County Medical Society has elected Dr. J. J. McFarland, Lebanon, President; Dr. R. E. Johnson, Lebanon, Vice-President; Dr. J. R. Bone, Lebanon, Secretary-Treasurer.

Bids have been opened for the construction of a Medical Arts Building in Memphis, at a cost of $900,000. Plans call for an eight story building which will be equipped exclusively to physicians and dentists.

The Civic League Hospital, Jackson, was destroyed by fire December 9. All patients were removed without injury.

Dr. M. B. McCreary, Woodbury, recently lost his office by fire.

Dr. John Cook has severed his connection with the Dyersburg General Hospital and gone West to locate.

(Continued on page 50)

An Investment In Safety

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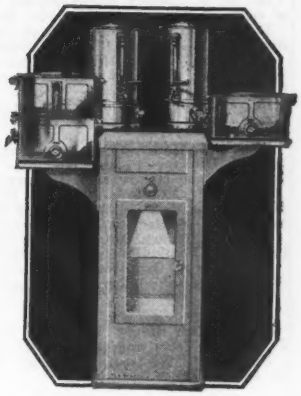

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Literature based upon evidence of many years' accumulation is ready for physicians who are interested. In making requisition, please ask for "Constipation" pamphlet.

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(Continued from page 48)

Dr. H. B. Everett, Binghampton, has been elected Chief of Staff of St. Joseph's Hospital, Memphis.

Dr. Duncan Eve, Jr., has been elected President of the Staff of St. Thomas Hospital, Nashville.

Dr. Jarrell Penn, Humboldt, has accepted the position as company physician with a large mining company in Gary, West Virginia.

Dr. Eugene L. Bishop has been appointed State Health Commissioner following the resignation of Dr. Charles B. Crittenden.

Dr. E. N. Haller, Chattanooga, has resigned as Assistant Medical Director to the Volunteer State Life Insurance Company, and is now associated with Dr. John B. Haskins.

Dr. S. F. McIntosh, who has been associated with Dr. Haskins, has assumed the duties of Assistant Medical Director to the Volunteer State Life Insurance Company.

Dr. W. F. Clary, Memphis, has been added on the Committee on Public Policy and Legislation.

Dr. Eugene Orr, Nashville, and Miss Nancy Warren, Spring Hill, were married February 1.

Deaths

Dr. William Henry Whitelaw, Memphis, aged 65, died January 23 from angina pectoris.

Dr. R. M. Wellborn, Arlington, aged 58, died January 23 from heart disease.

TEXAS

The Texas State Medical Association will hold its annual meeting in Austin, May 4-7.

Austin County Medical Society has elected Dr. O. E. Steck, Bellville, President; Dr. John Kroulik, Nelsonville, Vice-President; Dr. H. E. Roensch, Kenney, Secretary-Treasurer.

DeWitt County Medical Society has elected Dr. H. C. Eckhardt, Yorktown, President; Dr. G. T. Reuss, Cuero, Vice-President; Dr. B. J. Nowierski, Yorktown, reelected Secretary-Treasurer.

Ellis County Medical Society has elected Dr. A. T. Hampton, Ferris, President; Dr. J. T. Forehand Bardwell, Vice-President; Dr. Chas. A. Blind, Waxahachie, reelected Secretary-Treasurer.

Gonzales County Medical Society has elected Dr. J. B. Littlefield, Nixon, President; Dr. L. Stahl, Gonzales, Vice-President; Dr. W. T. Daw, Gonzales, Secretary-Treasurer.

Harris County Medical Society has elected Dr. Arthur H. Flickwir, President; Dr. Edgar H. Lancaster, Vice-President; Dr. Felician J. Slataper, Secretary; Dr. Jewell C. Alexander, Treasurer.

Hill County Medical Society has elected Dr. B. S. Smith, Hillsboro, President; Dr. A. B. McPherson, Lovelace, Vice-President; Dr. Chas. A. Garrett, Hillsboro, Secretary.

Hunt County Medical Society has elected Dr. H. W. Maier, Greenville, President; Dr. C. T. Bradford; Commerce, Vice-President; Dr. J. J. Handley, Greenville, Secretary.

Johnson County Medical Society has elected Dr. W. P. Ball, President; Drs. M. Dennis and J. M. Stallcup, Vice-Presidents; Dr. W. R. Washburn, reelected Secretary-Treasurer.

Lamar County Medical Society has elected Dr. T. W. Buford, Minter, President; Dr. J. R. Creed, Roxton, Vice-President; Dr. T. E. Hunt, Paris, Secretary.

(Continued on page 52)

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The resulting bronchitis may be resistant to treatment.

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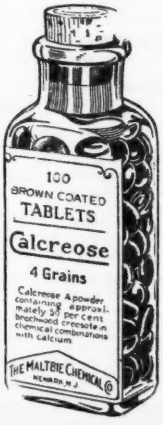

has yielded beneficent results, while at the same time acting as a tonic to the system in general.

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Leesburg, Va.

(Continued from page 50)

Lavaca County Medical Society has elected Dr. E. H. Marek, Yoakum, President; Dr. J. D. Gray, Yoakum, Vice-President; Dr. C. T. Dufner, Hallettsville, Secretary-Treasurer.

Upshur County Medical Society has elected Dr. F. Coslett, President; Dr. W. H. Buchan, Vice-President; Dr. J. G. Daniels, Secretary-Treasurer.

The Tri-State Medical Society of Arkansas, Louisiana and Texas, met in Shreveport, La., January 14-15. Dr. J. A. Hendrick, Shreveport, La., was elected President; Drs. H. C. Iron, Benton, La., R. Y. Phillips, Malvern, Ark., Charles R. Carter, Dallas, Vice-Presidents; Dr. Frank H. Walke, Shreveport, La., Secretary. Marshall was chosen as the next place of meeting.

The Fort Worth Medical and Surgical Clinics were held January 15.

A new $125,000 county city hospital will be built in Lamar County on a 25 acre tract recently purchased by the County.

Jefferson Davis Hospital will be erected at a cost of $24,283, and operated jointly by the City of Houston and Harris County.

Dr. Harry O. Sappington, Galveston, has been appointed State Health Officer to succeed Dr. Malone Duggan.

Dr. John H. Fletcher, Wichita Falls, has been appointed Health Officer of Wichita County, succeeding Dr. Walter B. Adams.

Dr. R. B. Homan, El Paso, for several years Councilor of the First District of the State Medical Association, has resigned and Dr. W. L. Brown, El Paso, has been appointed to fill the unexpired term.

Dr. Frank J. Marecic has resigned as City Health Officer of Flatonia.

Deaths

Dr. Edwin H. Gray, San Antonio, aged 62, died December 24 from angina pectoris.

Dr. Frank P. Yates, Rusk, aged 71, died January 17.

Dr. Lindsey K. Tainter, Fredericksburg, aged 65, died January 18 from pneumonia.

Dr. James Bell Hester, Buffalo, aged 37, died February 13 from heart disease.

Dr. Hiram M. Phillips, Terrell, aged 55, died December 23 following an illness of two weeks.

Dr. Bryan Handley, Corrigan, aged 28, was killed January 25 when the automobile in which he was driving overturned.

Dr. Byron F. Kingsley, San Antonio, aged 72, died February 1.

Dr. Watson Lycurgus Coleman, Dallas, aged 68, died February 5.

Dr. William Beverley West, Fort Worth, aged 65, died December 26, following a long illness.

Dr. Walter J. Crook, Dallas, aged 50, died January 27 from cerebral hemorrhage.

Dr. William Clarence Gould, Bells, aged 39, died January 6.

Dr. Isaac E. Smith, Pecos, aged 66, died January 1 at Houston.

Dr. Robert A. Johnson, Flatonia, aged 86, died October 24 following an illness of several months.

(Continued on page 54)

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They can be served so many different ways that each meal promises a surprise. Which way is best, is hard to decide. Puffed Grains seem to taste better each time they're offered, smothered with sugar and cream, with fresh or stewed fruit, or floated in bowls of milk.

Most important, *you* know that each child is getting the necessary daily ration of rich grains. Quaker Puffed Wheat and Puffed Rice are each extra quality kernels, embodying precious natural constituents. Steam exploded to eight times normal size, every food cell is broken. This means quick and easy digestion and assimilation, a fact to be considered when dieting the delicate child.

You, yourself, doctor, will enjoy Puffed Grains, both at breakfast and for the quick, hurried luncheon which is all you have time for on busy days. Just at bedtime a bowl of Puffed Wheat or Puffed Rice floated in milk invites restful sleep.

THE QUAKER OATS COMPANY

(Continued from page 52)

VIRGINIA

Dinwiddie County Medical Society has elected Dr. D. C. Mayes, Church Road, President; Dr. George W. Fultz, Butterworth, Vice-President; Dr. Wm. C. Powell, Petersburg, reelected Secretary-Treasurer.

Lynchburg and Campbell County Medical Society has elected Dr. Hunter B. Spencer, President; Dr. W. S. Ferguson, Vice-President; Dr. F. Musgrave Howell, Secretary-Treasurer.

Russell County Medical Society has elected Dr. E. P. Whited, Honaker, President; Dr. C. B. Greear, Honaker, Secretary-Treasurer.

With the erection of the new Medical Arts Building, Norfolk, the Norfolk County Medical Society arranged with the owners to add a half story and make the ninth floor the home of the Society. The Society moved into its new quarters January 1. A roof garden has been arranged and the floor is divided so there is a large assembly room about twice the size of the old quarters; and a reading room.

Memorial Hospital, Winchester, has received a check for $5,000 from Graham F. Blandy, of New York and Clarke County, Va., to endow a bed in the hospital as a memorial to his mother. Interest from this will be used for the up-keep of the bed which is to be for the free use of any resident of Clarke County who will not be able financially, to pay for hospital services.

Elizabeth Buxton Hospital, Newport News, will have a three story addition. Work has already been started, the entire cost of which will be $110,000.

The Crippled Children's Convalescent Hospital, Richmond, is the recipient of a $10,000 gift from Mrs. Alfred I. Dupont, as a memorial to her mother. Part of this will be used to build a heliotherapy room and the remainder to be used to draw interest to furnish a perpetual endowment for the hospital.

The Virginia Tuberculosis Association met in Richmond in January. Dr. Charles R. Grandy, Norfolk, was reelected President; Dr. E. C. Levy, Richmond, Vice-President; Dr. Roy K. Flannagan, Richmond, Secretary.

Dr. Bertha D. Berger, Assistant Physician at the Western State Hospital, Staunton, for sixteen years, is now resident physician at the Grundy Sanitarium, Catonsville, Md.

Dr. Dean B. Cole, Richmond, has been appointed head of the Tuberculosis Division of the Bureau of Health.

Dr. J. A. Wright, Doswell, has been named Secretary of the Hanover County Board of Health, succeeding the late Dr. H. B. Anderson, Noel.

Dr. William H. Higgins, Richmond, has been elected Secretary-Treasurer of the local chapter of the Kappa Alpha Fraternity.

Dr. P. D. Lipscomb, Richmond, has been elected Surgeon of the Stonewall Jackson Camp, Sons of Confederate Veterans.

Dr. Lewis M. Allen, Winchester, has been named a member of the executive committee of the Clarke County Horse and Colt Show Association.

Dr. A. I. Dodson, Richmond, has been appointed a captain in the Medical Corps of the Virginia National Guard and will be attached to the 246 coast artillery. He succeeds Dr. E. T. Trice, Richmond, who has been promoted.

(Continued on page 56)

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Medium: 1¾ pounds;
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Cooks in 3 to 5 minutes

The kind you have always known

(Continued from page 54)

Dr. William T. Graham, Richmond, has been elected President of the Harvard Club of Virginia.

Dr. W. C. Webb, Disputana, has been elected President of the County Council of Prince George.

Dr. E. W. Young, Petersburg, has been elected senior commander of the Old Dominion Post No. 632, Veterans of Foreign Wars.

The following physicians have been named members of various committees of the Richmond Chamber of Commerce: Drs. Paul V. Anderson, Charles A. Blanton, J. Shelton Horsley, J. Morrison Hutcheson, Clifton M. Miller, Wm. H. Parker, Robert S. Preston, Charles R. Robins, and Carrington Williams.

Dr. Mosby G. Perrow, Lynchburg, was recently elected as one of the directors of the Lynchburg Inter-State Fair Association.

The President of the Medical Society of Virginia, Dr. Hunter McGuire, has made the following appointments: Military Committee of the Medical Society of Virginia: Drs. Garnett Nelson, Richmond, Chairman, B. B. Dutton, Winchester, B. R. Kennon, Norfolk and J. T. McKinney, Roanoke. Committee to make study of Industrial Insurance and make report at next annual meeting: Drs. Israel Brown, Norfolk; James K. Hall and W. Lowndes Peple, Richmond. Chairman of the Walter Reed Memorial Association, Dr. E. C. S. Taliaferro, Norfolk. Dr. Taliaferro succeeds Dr. Garnett Nelson, who resigned.

Dr. John M. G. Ryland and Miss Virginia Randolph Davis, both of Richmond, were married January 27.

Dr. Oscar C. Page and Miss Nettie Clements, both of Brodnax, were married January 18.

Deaths

Dr. Albert Sidney Priddy, Colony, aged 59, died January 13 at the Virginia Baptist Hospital, Lynchburg, from Hodgkin's disease.

Dr. Allen Grandberry Thurman, Appomattox, aged 48, died January 31 at the Marshall Lodge Memorial Hospital, Lynchburg.

Dr. Edward May Magruder, Charlottesville, aged 66, died January 11.

(Continued on page 58)

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(Continued from page 56)

WEST VIRGINIA

The West Virginia State Medical Association will hold its next meeting in Bluefield, June 9-12.

Raleigh County Medical Society has elected Dr. Robert Wriston, President; Drs. T. F. Garrett and F. J. Moore, Vice-Presidents; Dr. O. B. Lynch, Secretary-Treasurer.

The Wheeling Hospital Conference was held January 13. The following officers were elected: Dr. John Gilmore, President; Dr. William S. Webb, Vice-President; Dr. O. D. McCoy, re-elected Secretary-Treasurer.

In an address before the Kanawha County Medical Society, Charleston, January 20, Dr. John N. Simpson, Dean and Professor of Medicine, West Virginia University School of Medicine, Morgantown, said the school of medicine now has but two small rooms for the 110 students in the two classes. Out of the more than 400 applicants for entrance for the current year, only sixty-one students could be selected because of lack of room. Dr. Simpson urged members of the Society to support any feasible plan to enlarge the medical school and to establish the complete medical curriculum.

The St. Francis Hospital announces that their new building will soon be open.

Dr. Floyd F. Farnsworth has been elected Mayor of Milton.

Dr. T. A. Lamb, Dunbar, has become full-time medical officer for the Veterans' Bureau.

Dr. Samuel H. Burton and George M. Burton, Weston, have been appointed School Examiners for the Independent Districts of Weston.

Dr. Robert J. Snider, Jr., Wheeling, and Miss Mary Louise Shaw, Chillicothe, Ohio, were married at Columbus, January 17.

Dr. Robert Evan Vickers, Huntington, and Miss Blanche Bush, Ceredo, were married January 10.

Deaths

Dr. John T. Huff, Parsons, aged 88, died January 25.

Dr. David J. States, Moundsville, aged 79, died January 20 at Pittsburg.

Dr. L. M. Thacker, Hamlin, aged 66, died January 28 from heart disease.

Dr. William Londas Yancy Currey, Sandyville, aged 55 died January 20.

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